Administrators' Perceived Knowledge, Importance, and Perceptions of the International Society for Technology in Education Standards for Administrators and Virginia Technology Standards for Instructional Personnel

Kimberly Tomeka Hill Muchenje

Follow this and additional works at: https://scholarsjunction.msstate.edu/td

Recommended Citation

This Dissertation is brought to you for free and open access by the Theses and Dissertations at Scholars Junction. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of Scholars Junction. For more information, please contact scholcomm@msstate.libanswers.com.
Administrators’ perceived knowledge, importance, and perceptions of the International Society for Technology in Education Standards for Administrators and Virginia Technology Standards for Instructional Personnel

By
Kimberly Tomeka Hill Muchenje

A Dissertation
Submitted to the Faculty of Mississippi State University in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy in Instructional Systems and Workforce Development in the Department of Instructional Systems and Workforce Development

Mississippi State, Mississippi
August 2018
Administrators’ perceived knowledge, importance, and perceptions of the International Society for Technology in Education Standards for Administrators and Virginia Technology Standards for Instructional Personnel

By

Kimberly Tomeka Hill Muchenje

Approved:

__________________________
Chien Yu
(Director of Dissertation/Major Professor/Graduate Coordinator)

__________________________
Stephanie King
(Minor Professor)

__________________________
Mabel Okojie
(Committee Member)

__________________________
Debra Prince
(Committee Member)

__________________________
Wei-Chieh Wayne Yu
(Committee Member)

__________________________
Richard Blackbourn
Dean
College of Education
The purpose of the study was to determine administrators’ self-assessed perceived knowledge, importance, and perceptions of the International Society for Technology in Education Standards for Administrators (ISTE Standards-A) and the Virginia Technology Standards for Instructional Personnel (VTSIP). A survey instrument based on the ISTE Standards-A and the VTSIP was used in the study. 43 administrators in Virginia participated in the study. The participants were members of the Virginia Association of Elementary or Secondary School Principals.

The study found that administrators perceived their knowledge of the ISTE Standards-A as good and their knowledge of the VTSIP as excellent. Administrators strongly agreed that both the ISTE Standards-A and the VTSIP were important in their practice. Additionally, their perceptions of both the ISTE Standards-A and the VTSIP were excellent. There were no statistically significant differences found between the perception of the standards and most of the demographic variables. However, there was a statistically significant difference found between male and female perceptions of the
VTSIP. Also, there was a statistically significant difference found between administrators’ perceptions of the ISTE Standards-A and perceptions of the VTSIP.

The study provided quantitative data on administrators’ perceived knowledge, importance and perceptions of practicing the ISTE Standards-A and the VTSIP. The findings of this study provide valuable information for administrators as they investigate their technology leadership and note areas of improvement, and for the Virginia Department of Education, local education agencies and universities. It is recommended that future research look qualitatively at administrator perceptions of the standards and why males and females differ in their perception of the standards. Further research is also recommended using a larger sample in the state or nationwide, and conducting more research to look into administrative leadership preparation programs, administrators’ perceptions of practice, program alignment or administrator implementation of the ISTE Standards-A and the VTSIP.
DEDICATION

I would like to dedicate this dissertation to my loving and supportive family who has inspired me to work hard: my husband, son, son to be, mom, dad, and sister. My husband provided constant support, unwavering faith and encouragement during the challenges of completing this dissertation; he continued to push me and encouraged me to set goals to stay on course. My son was patient and gave up his mom from time to time so that she could work on her dissertation at the library. My parents encouraged me to work hard and always had faith in me. My sister read my work and gave me positive feedback.

Also, to my extended family, I dedicate this work. There was some intrinsic motivation to get this dissertation done. Completing the dissertation for me is a first in the immediate family on my mom’s side of the family and second on my father’s side of the family. Additionally, completing this dissertation will inspire other family members and my own husband and children to continue to excel and be the best that they can be and know that they can do whatever they aspire to be.
ACKNOWLEDGEMENTS

“To God be the glory for the great things He has done.” This would not be possible without God. He has placed people in my path to mentor and guide me through this process. I am humble and grateful to all those who played a part in my completion of this dissertation. I acknowledge all those who inspired me along the way. Thank you to one of my professors, Dr. Cornelious, for complimenting my writing while in one of her graduate courses; little to her knowledge that ignited a spark in a lady who did not do the best in freshman comp and may not have continued if it were not for her comment. Thank you to a former committee member who is no longer with us, Dr. Hare, for reading my work and making suggestions, especially in the formation of my instrument. Thank you to my outstanding committee members: Dr. Okojie, Dr. Wayne Yu, Dr. Prince, and Dr. King for your guidance, comments, suggestions and commitment to education. Finally, I would like to express the deepest appreciation for my committee chair/dissertation director Dr. Chien Yu for her guidance, direction, and willingness to work with me. She was very positive and encouraging and gave great constructive feedback. As a mentor and teacher, she has led by example and taught me how great professors should be. Without her guidance, this dissertation would not have been completed.

Family has been the most important in this quest of completing my dissertation. I thank my parents for expecting and accepting nothing but the best from me. I thank my sister for her editorial comments and quick feedback on my writing. Most importantly, I
am thankful for my devoted and understanding husband, Lovejoy, and sons, Malcolm and the one to be, who can learn from mom that the sky is the limit, knowledge is power and education is yours and cannot be taken from you.

Although, this journey has been met with test and trials, Romans 8:28 (KJV) says: “And we know that all things work together for good to them that love God, to them who are the called according to his purpose.” Everything has come together as I am fulfilling one of His purposes for my life.
# TABLE OF CONTENTS

**DEDICATION** .................................................................................................................... ii  
**ACKNOWLEDGEMENTS** ................................................................................................... iii  
**LIST OF TABLES** ........................................................................................................... viii  
**CHAPTER .......................................................................................................................... 1**  

## I. INTRODUCTION ............................................................................................................. 1  
- Statement of the Problem ...................................................................................... 4  
- Purpose of the Study .............................................................................................. 5  
- Research Questions ............................................................................................... 6  
- Significance of the Study ....................................................................................... 7  
- Limitations ............................................................................................................. 8  
- Delimitations ......................................................................................................... 9  
- Definition of Terms ............................................................................................... 9  

## II. LITERATURE REVIEW ............................................................................................... 11  
- Education and Technology .................................................................................. 11  
- Role of Administrators ........................................................................................ 13  
- Administrators and Technology .......................................................................... 16  
- Technology Leadership ....................................................................................... 19  
- Education and Standards ..................................................................................... 22  
  - Technology Standards for School Administrators ........................................ 24  
  - ISTE Standards ................................................................................................. 25  
  - ISTE Standards-A .............................................................................................. 26  
  - VTSIP 29 Standards and Technology Leadership Studies ................................ 31  

## III. METHODOLOGY ........................................................................................................ 35  
- Research Design .................................................................................................. 35  
- Population ............................................................................................................ 37  
- Instrumentation .................................................................................................... 38  
  - Validity and Reliability of the Instrumentation ............................................... 41  
  - Pilot Study ......................................................................................................... 42  
- Variables of the Study ......................................................................................... 43
IV. RESEARCH FINDINGS ................................................................. 56

Research Questions ........................................................................... 56
Demographics ......................................................................................... 57
   Age ..................................................................................................... 58
   Current administrator title ................................................................. 58
   Current level of administration ......................................................... 59
   Gender ............................................................................................... 59
   Ethnicity ............................................................................................. 60
   Highest Degree Completion .............................................................. 60
   Years in Administration .................................................................... 61
   Region ................................................................................................. 62

Research Question 1 ........................................................................... 62
   Section II: Visionary Leadership ......................................................... 63
   Section III: Digital Age Learning Culture ........................................... 63
   Section IV: Excellence in Professional Practice ................................. 63
   Section V: Systematic Improvement ................................................... 64
   Section VI: Digital Citizenship .......................................................... 64
   Section VII: VTSIP ........................................................................... 68

Research Question 2 ........................................................................... 70
   Section II: Visionary Leadership ......................................................... 70
   Section III: Digital Age Learning Culture ........................................... 70
   Section IV: Excellence in Professional Practice ................................. 71
   Section V: Systematic Improvement ................................................... 71
   Section VI: Digital Citizenship .......................................................... 71
   Section VII: VTSIP ........................................................................... 75

Research Question 3 ........................................................................... 77
Research Question 4 ........................................................................... 78
Research Question 5 ........................................................................... 79
Research Question 6 ........................................................................... 84

V. CONCLUSION .................................................................................. 90

Research Methodology and Findings .................................................. 91
Other Comments and Concerns of ISTE Standards-A and VTSIP .......... 95
Discussions .......................................................................................... 96
Conclusions ......................................................................................... 98
Implications ......................................................................................... 100
Recommendations .............................................................................. 102

REFERENCES .................................................................................... 103

APPENDIX .......................................................................................... 118
LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Distribution of Cronbach Alpha Levels by Survey Section</td>
<td>42</td>
</tr>
<tr>
<td>2</td>
<td>Mean Interpretation Table</td>
<td>47</td>
</tr>
<tr>
<td>3</td>
<td>Distribution and Percentage of Age</td>
<td>58</td>
</tr>
<tr>
<td>4</td>
<td>Distribution and Percentage of Current Administrator Title</td>
<td>59</td>
</tr>
<tr>
<td>5</td>
<td>Distribution and Percentage of Current Level of Administration</td>
<td>59</td>
</tr>
<tr>
<td>6</td>
<td>Distribution and Percentage of Gender</td>
<td>600</td>
</tr>
<tr>
<td>7</td>
<td>Distribution and Percentage of Ethnicity</td>
<td>60</td>
</tr>
<tr>
<td>8</td>
<td>Distribution of Highest Degree Completion</td>
<td>611</td>
</tr>
<tr>
<td>9</td>
<td>Distribution and Percentage of Years in Administration</td>
<td>61</td>
</tr>
<tr>
<td>10</td>
<td>Distribution and Percentage of Region</td>
<td>62</td>
</tr>
<tr>
<td>11</td>
<td>ISTE Standards-A: Perceived Knowledge Mean and Standard Deviation</td>
<td>655</td>
</tr>
<tr>
<td>12</td>
<td>ISTE Standards-A Perceived Knowledge Mean and Standard Deviation of Standards</td>
<td>67</td>
</tr>
<tr>
<td>13</td>
<td>VTSIP Perceived Knowledge Mean and Standard Deviation of Standards</td>
<td>699</td>
</tr>
<tr>
<td>14</td>
<td>ISTE Standards-A: Perceived Importance Mean and Standard Deviation</td>
<td>722</td>
</tr>
<tr>
<td>15</td>
<td>ISTE Standards-A Perceived Importance Mean and Standard Deviation</td>
<td>755</td>
</tr>
<tr>
<td>16</td>
<td>VTSIP Perceived Importance Mean and Standard Deviation</td>
<td>766</td>
</tr>
<tr>
<td>17</td>
<td>ISTE Standards-A Perceived Perception Mean and Standard Deviation</td>
<td>777</td>
</tr>
<tr>
<td>18</td>
<td>VTSIP Perceived Perception Mean and Standard Deviation</td>
<td>788</td>
</tr>
<tr>
<td>Page</td>
<td>Title</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Paired Samples t-Test Statistics by ISTE Standards-A and VTSIP Total Perception Scores</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>ANOVA Summary Table within ISTE Standards-A Perception Based on Age</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>ANOVA Summary Table within ISTE Standards-A Perception Based on Current Title</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>ANOVA Summary Table within ISTE Standards-A Perception Based on Level of Administration</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Independent Samples t-Test Perceived Perception of the ISTE Standards-A by Gender</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>ANOVA Summary Table within ISTE Standards-A Perception Based on Ethnicity</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>ANOVA Summary Table within ISTE Standards-A Perception Based on Highest Completed Degree</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>ANOVA Summary Table within ISTE Standards-A Perception Based on Years in Administration</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>ANOVA Summary Table within ISTE Standards-A Perception Based on Region of Employment</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>ANOVA Summary Table within VTSIP Perception Based on Age</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>ANOVA Summary Table within VTSIP Perception Based on Current Title</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>ANOVA Summary Table within VTSIP Perception Based on Level of Administration</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Independent Samples t-Test Perceived Perception of the VTSIP by Gender</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>ANOVA Summary Table within VTSIP Perception Based on Ethnicity</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>ANOVA Summary Table within VTSIP Perception Based on Highest Completed Degree</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>ANOVA Summary Table within VTSIP Perception Based on Years in Administration</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>ANOVA Summary Table within VTSIP Perception Based on Region of Employment</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER I
INTRODUCTION

Late in the 20th Century, technology became a leading force in human society and it continues to be a leading force in this 21st Century (Garcia & Abrego, 2014; Sahin, 2013). Technology is in many aspects of peoples’ lives, and its integration into the daily process and procedures of life is unescapable (Cakir, 2012). As a learning tool, technology is causing a mind shift in schools (Richardson, Flora, & Bathon, 2013) and is considered to be an indicator of high-quality education (Cakir, 2012). According to Ross and Bailey (1996) and Stewart (2013), administrators hold the key to a high-quality education. The administrator’s role in providing a high-quality education includes the ability to manage, support, and incorporate best practices for student achievement (Afshari, Bakar, Luan, & Siraj, 2012; Chang, 2012; Piggot-Irvine, Howse, & Richard, 2013). A best practice includes the administrator’s ability to provide technology leadership within the school (Richardson et al., 2013). Providing technology leadership requires administrators to be aware of their perception and practice of their national and state technology standards (Demory, 2011).

The role of the administrator in educational settings is more critical than ever (Carver & Klein, 2013; Rieckhoff, 2014). Due to political, economic, and societal changes, the role of the administrator has changed (Prytula, Noonan, & Hellsten, 2013). Administrators were once considered managers and coordinators, but now they have
many other roles and responsibilities (Prytula et al., 2013; Rieckhoff, 2014).
Administrators are authority figures and are held accountable for student success
(Rieckhoff, 2014; Ward, 2013). They have to explain why their schools do and do not
meet accreditation and accountability standards. They endorse and follow a system of
accountability internal to their school and must hold themselves accountable for student
achievement (Louis, Knapp, & Feldman, 2012). The stress of accountability has made the
administrators’ role shift from manager to instructional leader (Prytula et al., 2013).
Chang (2012) wrote that the role of the administrator has changed from manager, to
instructional leader and now to technology leader.

Since public education’s adoption of the mandate No Child Left Behind, accountability in education is a focus of many administrators (Hilliard & Jackson, 2011; Williams & Szal, 2011). No Child Left Behind was a federal law that supported standards-based reform. This mandate along with the other duties of an administrator is causing challenges in administrative leadership (Connelly, 2008; Hilliard & Jackson, 2011). Administrative leadership is defined as “leadership work that is focused on the improvement of teaching and learning” (Louis & Robinson, 2012, p. 634).
Administrative leadership is achieved through organizing tasks and creating systems.
Administrative leadership also requires technology leadership (Iudica, 2011). Anderson and Dexter (2005) define technology leadership as a leader’s role in “organizational decisions, policies or actions that facilitate effective utilization of information technology throughout the school” (p. 80). Research has concluded that strong technology leadership leads to success with technology within schools (Anderson & Dexter, 2005).
In today’s technology-rich society, administrators must be technology leaders (Richardson & McLeod, 2011). They need to be competent in teaching, learning, budgeting, and social and ethical issues as they relate to technology. One organization that focuses its publications towards competency in technology leadership is the International Society for Technology in Education (ISTE). Additionally, the Virginia Department of Education (VDOE) has as one of its focuses, technology competency. The VDOE is the Commonwealth of Virginia’s state education agency. Furthermore, the Commonwealth of Virginia is at the forefront when it comes to the use of technology (VDOE, 2012a).

Garcia and Abrego (2014) stated that standards are contained in an instrument that can be used to measure administrators’ perception of their skills. Educational technology standards are one facet of education that may be used to measure technology skills. The ISTE has created educational technology standards for students, teachers, coaches, administrators and computer science teachers (ISTE, 2011a). This study focuses on the revised ISTE Standards for Administrators (ISTE Standards-A). The ISTE Standards-A denote the skills and knowledge administrators need to be successful with technology leadership (Rieckhoff, 2014). The standards are comprised of five themes: *Visionary Leadership, Digital Age Learning Culture, Excellence in Professional Practice, Systematic Improvement* and *Digital Citizenship* (Garcia & Abrego, 2014; ISTE, 2011).

In May 2008, the State Board of Education and VDOE released the “Educational Technology Guidelines” (Duncan, 2011). The guidelines outline the processes and procedures for successfully implementing technology within the educational setting. Contained within the document is a reference to the Virginia Technology Standards for
Instructional Personnel (VTSIP). The VTSIP were created by the VDOEs’ Virginia Board of Education as a guideline to follow to ensure administrators and other educators use technology to “engage students, manage information and support decisions that improve student learning and achievement” (VDOE, 2012b, para. 3).

**Statement of the Problem**

Accountability is a buzzword in education. It involves holding districts, schools, administrators, educators and students liable for results. “Strict, high-stakes accountability systems are a central feature of standards-based reform at local, state and federal levels these days” (Louis et al., 2012, p. 666). According to Lee, Walker, and Chui (2012), “school accountability policies increasingly hold a prominent place in government education reform agendas” (p. 586). This measure of accountability plays a part in funding for schools. As such, a continual focus of the national government is improving public education and access for all by emphasizing standards and accountability (Bergacs, 2008). This emphasis is just not on educational standards as they relate to core subjects but on technology standards as well because technology is altering the way students learn, teachers teach and administrators lead (Bergacs, 2008; Rajasingham, 2011). Standards are not going away and are here to stay. As a result, many organizations and departments work on developing standards focused on the technology leadership of administrators. In an effort to develop consensus on technology standards for school administrators, the ISTE and the state of Virginia developed technology standards for administrators. Little literature however revealed how administrators perceive their knowledge and the importance of the ISTE Standards-A and VTSIP. This limited amount of research on administrators and technology is disheartening being that
administrators are at the forefront of schools and their progress. Administrators should have literature and research that they may refer to that will help them improve their knowledge of technology and what is best for schools and accountability.

Administrator mastery of professional standards is often linked with positive school success and increased student achievement (Richardson, Bathon, Flora, & Lewis, 2012). Administrators in Virginia are required to implement the ISTE Standards-A and VTSIP. However, it is unclear if they possess knowledge of the ISTE Standards-A or VTSIP. It is also unclear if they recognize the importance of the technology standards. However, according to Yu and Durrington (2006), there is a lack of emphasis on technology competencies that will help administrators become leaders of their schools. Therefore, this study focused on administrators’ perceptions of practicing the ISTE Standards-A and the VTSIP, national and state technology competencies. Both sets of standards promote digital age learning and the implementation of technology into the education realm. The problem of this study was to investigate public school administrators’ perceived knowledge, importance and perceptions of the national and state technology standards as technology leaders within their schools.

**Purpose of the Study**

According to Richardson et al. (2012), there is a shortage of research on the ISTE Standards-A and technology standards and leadership. As a result, the purpose of the study was to determine administrators’ self-assessed perceived knowledge, importance, and perceptions of the ISTE Standards-A and the VTSIP. Additionally, demographic variables that compare relationships and differences in perceptions will be examined. The study will provide the VDOE and local education agencies with an indicator of how
important the standards are to administrators in their practice as administrators as well as their knowledge and perceptions of the ISTE Standards-A and the VTSIP as they look at implementing future technology standards and what administrators need in order to be effective leaders within their schools in this technology-rich society.

**Research Questions**

The study focused on administrators’ perceived knowledge, importance, and perceptions of the ISTE Standards-A and the VTSIP. This study was designed to answer the following questions:

1. How do administrators perceive their knowledge of the ISTE Standards-A and VTSIP?
2. How do administrators perceive the importance of the ISTE Standards-A and VTSIP?
3. What are administrators’ perceptions of the ISTE Standards-A and VTSIP?
4. Is there a statistically significant difference in administrators’ perceptions of the ISTE Standards-A and administrators’ perceptions of the VTSIP?
5. Is there a statistically significant difference between the administrators’ perceptions of the ISTE Standards-A and by select demographic variables: (a) age, (b) current administrator title, (c) current level of administration (elementary/middle/high), (d) gender, (e) ethnicity, (f) highest degree completion, (g) years in administration and (h) region?
6. Is there a statistically significant difference between administrators’ perceptions of the VTSIP and by select demographic variables: (a) age, (b) current administrator title, (c) current level of administration
(elementary/middle/high), (d) gender, (e) ethnicity, (f) highest degree completion, (g) years in administration and (h) region?

**Significance of the Study**

Research supports that knowledge of technology and technology leadership is essential to successful schools (Chang, 2012). Between research on technology standards and leadership, there is no study on Virginia administrators’ perceived knowledge, importance and perceptions of the ISTE Standards-A and the VTSIP. Therefore, the study is significant because it is designed to provide quantitative data on administrators’ perceived knowledge, importance and perceptions of practicing the ISTE Standards-A and the VTSIP. Administrators may use this information to investigate if their knowledge and implementation of technology in their profession makes them more effective in their career. Administrators may also use the information to improve their role as a technology leader and to further understand their competency level in relation to other administrators. This could make them more marketable in the quest to advance in their career. Statements responded to in the survey may encourage administrators to reflect more in their practice and note personal areas of improvement.

In addition, the outcomes of the study are important to the VDOE, universities that have an administrational leadership program, and local education agencies. Program revision and professional development may be developed to meet the needs of administrators based on the outcomes of the study and where there seems to be needs for improvement. The study was designed to assess administrators’ perceived knowledge, importance and perceptions of practicing the ISTE Standards-A and the VTSIP. Outcomes from the study may guide the state and university administrator preparation
program technology leadership goals. The VDOE and educators of the administrative leadership programs will know how administrators perceive their practice of the themes and standards contained within the ISTE Standards-A and the VTSIP. The VDOE and programs may further determine if they need to provide more professional development about the standards and in turn alter the way administrators should be practicing in their profession. Furthermore, university administrative leadership preparation programs will understand the need to stress importance and use of the standards. Results from the study may lead VDOE staff and institutional program managers to assess their current emphasis and integration of the ISTE Standards-A and the VTSIP, and consequently, alter some focus areas within their preparation programs or professional development opportunities (McCampbell, 2001; Styron & Styron, 2011). A grasp of administrators’ perceptions on their practice will help practitioners improve their efforts as well as help researchers understand technology leadership (Richardson, McLeod, & Sauers, 2015). Additionally, the study may spark more researchers to look into administrative leadership preparation programs, administrators’ perceptions of practice, program alignment or administrator implementation of the ISTE Standards-A and the VTSIP.

**Limitations**

The results were limited to the time when the study was conducted. The low number of responses to the survey limited what the statistics could show. Generalizations from the study should be limited to the population described and cannot be applied to any other group. Generalizations were also limited by the survey based on its reliability, validity and honesty of the respondents.
**Delimitations**

Virginia is a broad state with over 130 school districts divided into 8 regions. This population covered administrators from all over Virginia. The study was delimited to the those administrators who were members of the Virginia Association of Secondary School Principals and Virginia Association of Elementary School Principals during the spring of 2017.

**Definition of Terms**

The following definitions will provide the readers with a basic understanding of terms used in this study:

1. Administrators: A reference that includes principals, assistant principals and deans of public elementary, middle, high and technical schools.

2. ISTE: “A nonprofit, 501(c)(3) public-benefit corporation that is governed by an elected board of directors. The board provides strategic leadership and fiduciary oversight as it works to ensure progress toward organizational goals” (ISTE, 2016a, para. 1).

3. ISTE Standards: “The standards for learning, teaching and leading in the digital age [that] are widely recognized and adopted worldwide. The family of ISTE Standards work together to transform education” (ISTE, 2016b, para. 2).

4. ISTE Standards-A: “The standards for evaluating the skills and knowledge school administrators and leaders need to support digital age learning, implement technology and transform the instruction landscape” (ISTE, 2016b, para. 5).
5. National Educational Technology Standards for Administrators (NETS-A): The previous name of the ISTE-Standards A. The name change began in August of 2013. In earlier documents, the ISTE Standards-A are referred to as the NETS-A. Additionally they are “brief statements of topical coverage and expertise and dispositions that school leaders should have with regard to school technology leadership” (Richardson et al., 2015, p. 14).

6. Perception: According to Merriam-Webster online (2015), perception is “the way that you notice or understand something using one of your senses” (para. 3). For this study, perception was measured by averaging administrators’ knowledge of the standard and perceived importance of the standard in his or her practice.

7. VTSIP: “standards for instructional personnel [that] ensure teachers and other educators are able to harness the power of technology to engage students, manage information and support decisions that improve student learning and achievement.” (VDOE, 2012b, para. 3).
CHAPTER II
LITERATURE REVIEW

This chapter presents the review of literature relevant to this study. The chapter is divided into the following sections: (a) Education and Technology, (b) Role of Administrators, (c) Administrators and Technology, (d) Technology Leadership (e) ISTE Standards-A (f) VTSIP, and (g) Standards and Technology Leadership Studies.

Education and Technology

Technology is advancing and increasing access to information (Kurt, Coklar, Kilicer, & Yildirim, 2008). Technology is changing the lives of people, careers and schools (Collins & Halverson, 2009). It is evolving at a rapid rate and requires continual learning (Rajasingham, 2011; Summak, Samancioğlu, & Bağlibel, 2010; Yu & Durrington, 2006). Due to technology’s rapid evolution, schools and other organizations are being pressured to keep up (Downes, Bishop, Swallow, Olofson, & Hennessey, 2015). Richardson et al. (2012) noted that modern technology is creating challenges and opportunities for schools. We live in a society that uses data and technology to communicate worldwide. There is greater access to technology and it is being used in a variety of contexts, especially in education (Franklin & Bolick, 2007; Garland, 2010; Kopcha, 2010). Technology is advancing and changing the operations of educational institutions (Summak et al., 2010). Nearly 100% of the schools in the United States provide Internet access (Ritzhaupt, Liu, Dawson, & Barron, 2013). Due to the
accessibility of the Internet, educators are integrating technology even more into the instructional process (Garland, 2010). As more people and students become dependent on technology, parents and students will expect education to incorporate technology into its day to day curriculum practices (Garcia, 2013).

Technology in education is boundless. Schools around the world are using technology in the education process (Cakir, 2012). It enhances the teaching process and makes education more equitable and accessible. Technology can influence the delivery of education and personalize the learning process for students (Franklin & Bolick, 2007; Styron & Styron, 2011; Summak et al., 2010). Subsequently, technology plays an important role in student achievement; thus, millions of dollars have been given towards technology in schools (Cakir, 2012; Wodarz, 2002). Accordingly, some states have given districts monies toward technology improvements and access for all (Bergacs, 2008; McCampbell, 2001). As a result, students and parents have increasing technology expectations. Additionally, many students come to school with excessive technology knowledge (Eren & Kurt, 2011). Technology has the power to change education ("Virginia Society," 2011). Technology changes what we learn and how we learn (ISTE, 2011a). In the 21st Century, literacy in technology is a must. If the United States wants to be at the forefront of technology, students must be able to use technology. To enforce student use, teachers and administrators must be knowledgeable about technology ("Virginia Society," 2011).

Today’s schools must prepare students for tomorrow’s world. Technology and its ability to enhance student interactions with real-world applications allow students to compete in this competitive society ("Technology," n.d.). However, many schools are
lacking in technology and its integration (Center, 2011; "Technology," n.d.). Consequently, schools are not preparing students with 21st-Century technology skills ("Technology," n.d.). Administrators have to be the lead when it comes to technology integration and overseeing schools that are focused on 21st-Century technology skills (Connelly, 2008). Thus, the administrator must embrace and prepare for this new learning environment (Richardson & McLeod, 2011).

**Role of Administrators**

The administrators’ role is becoming more difficult and challenging (McNabb, 2006). Back during the one room schoolhouse days, the teacher performed the duties of the administrator (Prytula et al., 2013). In the 1970’s vocal and active unions formed and the role of the administrator drastically changed and later followed with improved centralization and bureaucracy (Prytula et al., 2013). Hallinger (1992) described the change in the role of the administrator as a program administrator in the 60s and 70s, an education and school leader in the 80s, and a change and transformation administrator in the 90s. Goldring (1992) noted that administrators were once transactional leaders and are now transformational leaders. She continued and wrote that they must “create something new out of something old” (p. 52). Goldring revealed that administrators are changing from routine managers to leader managers, resource receivers to resource mobilizers, bureaucratic to professional, centralized to pluralistic and monopolistic to competitive. Administrators used to be managers of schools. However, with accountability and student success in the forefront, administrators must be visionary and knowledgeable of ways to lead effectively and support student learning (Connelly, 2008; Hilliard & Jackson, 2011; McNabb, 2006; Rucker-Cortez, Irons, Kirk, & Stephens,
Administrators must be models for their staff and lead by example. They should look at best practices and current research (Afshari et al., 2012). They must read literature and stay abreast of current issues in education (Banoglu, 2011; Rudnesky, 2006).

The role of school administrator is important (Piggot-Irvine et al., 2013). They are important in the execution of any innovation (Garcia, 2013; Sahin, 2013). They make critical decisions (Gulcan, 2012). Additionally, administrators are an important component of school reform (Grabe & Grabe, 2004); they are employed in an era of unmatched policy activism (Louis & Robinson, 2012). Administrators oversee a variety of functions (Rieckhoff, 2014). They make sure the school is in line with its goals (Gulcan, 2012). One must know curriculum, understand collaboration, be interpersonal and distinguish between management and leading instruction (Chang, 2012; Gulcan, 2012; Piggot-Irvine et al., 2013; Stewart, 2013). He or she must foresee the future and have a vision and be able to get others on board with their vision (Afshari, Bakar, Luan, Samah, & Fooi, 2009; Chang, 2012; Garcia, 2013; Gulcan, 2012; Piggot-Irvine et al., 2013; Richardson et al., 2013; Rieckhoff, 2014); they should possess negotiating, communication (Chang, 2012; Garcia, 2013; Piggot-Irvine et al., 2013), and collaboration skills (Lavery & Hine, 2013; Piggot-Irvine et al., 2013; Rieckhoff, 2014). One must know when and what to delegate (Piggot-Irvine et al., 2013). Piggot-Irvine et al. (2013) listed the roles of the administrator as: managing, learning, teaching, coaching, leading, budgeting, mentoring, and accounting. Additionally, administrators should be knowledgeable about school culture, policy, governance, legislation, and project management. In addition, their role includes understanding constructivists learning, the
power of relationships, the power of risk-taking and the need for change (Piggot-Irvine et al., 2013).

Standards, testing and accountability have changed and heightened the administrators’ role in education (Connelly, 2008; "School Leadership," n.d.; McCampbell, 2001). According to Louis, Spillane, and Kenney (2012), those initiatives have put pressure on the administrator to make their schools be successful in those areas as well as maintain the schools’ legitimacy and integrity. Subsequently, the administrator’s role in education is expanding into a more complicated role within the new learning environment (Piggot-Irvine et al., 2013). The new learning environment requires current administrators to possess a different set of leadership skills than previously required (Prytula et al., 2013). Cakir (2012) wrote that the roles and responsibilities of the administrators have changed. The administrator should understand change, be open to innovation, teach and learn (Cakir, 2012). Afshari et al. (2012) also noted that administrators should be learners. Administrators must increase their own pedagogical knowledge to influence their leadership activities (Piggot-Irvine et al., 2013).

The role of the administrator has to be considered to successfully implement technology in schools (Afshari et al., 2012). Hess (2003) commented that an added role and responsibility to include is technology leader. To be an effective administrator, one should be involved as the technology leader (Chang, 2012). Accordingly, administrators’ actions toward technology integration are important due to their role in school reform (ISTE, 2011b).
Administrators and Technology

There is already a large presence of technology in schools, and districts are enforcing administrators to be more forward thinking and possess technology skills (Garcia & Abrego, 2014). The influence of technology is proving to be a challenge to administrators (Williams & Szal, 2011). Ten years ago, the role of the administrator and effective technology use was not a topic of conversation. However, it is now concluded that administrators’ knowledge of technology will help improve student learning (McCampbell, 2001). According to Kruse and Buckmiller (2015), administrators should be able to “harness technology to improve students’ education [and] support technological advancement within their schools” (p. 76). They continue and note that administrators must understand their role in implementing technology and the impact their decisions may have on student achievement. Schiller (2003) noted that administrators must understand new technology and be proficient in its use in order to promote a school culture that is technology savvy. Marzano, Waters, and McNulty (2005) and Robinson, Lloyd, and Rowe (2008) wrote that strong administrative leadership is a major factor of increased student achievement. It has been found that administrators account for 25% of school efforts that affect student achievement; thus they are in a position that can initiate change and impact the educational achievement of students (Richardson et al., 2015). Administrators are on the forefront of change and have to implement change during this economic recession. Administrators have “a duty to become informed activists in promoting access to technology” (Garland, 2010, p. 40). Administrators must be experienced in technology and how it is useful in the teaching and learning environment (ISTE, 2011b). Their knowledge of technology and how it
works will help them create an equal opportunity technology school environment (Ertmer et al., 2002; Garland, 2010; Knezek, 2002; Styron & Styron, 2011).

The successful integration of technology into education is a demanding component of an administrator’s career (Garland, 2010; Geer, 2002; "School Leadership," n.d.). However, administrators are role models for the adoption and integration of technology and must be ready to support the innovative use of technology (Chang, 2012; Garcia, 2013). They should be flexible, adaptable and innovative (Richardson et al., 2013). Administrators should have technology competency (Afshari et al., 2012; Richardson & McLeod, 2011). They should not be “jumping on technological bandwagons” (Kruse & Buckmiller, 2015, p. 77) but critically assessing technology and its use within their school. Administrators must be familiar with hardware and software capabilities of computers. They should be prepared to implement the modern technologies (Richardson et al., 2013). They should be able to help teachers integrate technology into the learning and teaching process (Garcia & Abrego, 2014). Cakir (2012) wrote that administrators must be able to troubleshoot, encourage and assist. Administrators should be able to select effective equipment (Garcia & Abrego, 2014) and keep up with new technologies and their use (ISTE, 2011b). Furthermore, they should be abreast of the new technology developments (Cakir, 2012). Administrators should understand new technologies and the advantages and disadvantages of the technology (Afshar et al., 2012; Cakir, 2012). They should use technology for data analysis. Administrators should possess information and technology skills to help the school environment flourish in the realm of technology (Chang, 2012). Administrators must be cognizant of technology management (Chang, 2012).
Administrators should be involved in technology planning for their schools (Garcia, 2013). Administrators should ensure that there is “an equal opportunity technology environment” for all students (Richardson et al., 2013, p. 148). Creighton (2003) wrote that as technology leaders, administrators must “become involved in discovering, evaluating, installing, and operating new technologies of all kinds while keeping in mind teaching and student learning as the guide and driving force behind it all” (p. 3). Afshari et al. (2012) commented that administrators should have fluency in technology basics such as spreadsheets, presentation software and word processing applications; they should be fluent users of the Internet as a communication tool between all stakeholders. Administrators should promote technology literacy and new educational technologies (Chang, 2012).

Administrators must stay current with technology in education because technology is omnipresent and here to stay (Yu & Durrington, 2006). They must prioritize and make sure technology is used to support the learning process (Banoglu, 2011; Davies, 2010; Donmoyer, 2012; Rudnesky, 2006). Administrators must ensure that technology is used effectively in their schools. To help in this process, some state education departments have developed technology plans that begin to address how administrators can effectively implement technology (Yu & Durrington, 2006). Virginia is one of those states. They are nationally recognized as a leader in the use of technology (VDOE, 2012a).

School effectiveness is influenced by the leadership of an administrator (Anderson & Dexter, 2005). Additionally, administrators can influence student achievement ("School Leadership," n.d.). Rieckhoff (2014) indicated that there is a direct
link between the administrators’ role and student achievement. Thus, administrators must look at means of increasing student achievement (Piggot-Irvine et al., 2013). Administrators, as leaders, impact student learning and achievement (Carver & Klein, 2013; Marzano, 2013; Piggot-Irvine et al., 2013; Preston, Jakubiec, & Kooymans, 2013; Rieckhoff, 2014; Stewart, 2013). Second to teachers, administrators are the next most important factor that affects student performance ("School Leadership," n.d.; Ogle, 2002). However, “the leadership role of the [administrator] is the single most important factor affecting the successful integration of technology” (Afshari et al., 2009, p. 236).

**Technology Leadership**

An expanding role of the administrator includes technology leadership (Richardson et al., 2013; Richardson & McLeod, 2011). According to Weng and Tang (2014), technology leadership is a major component of school administration. Knowledge of technology and efficient technology leadership is essential to successful schools (Chang, 2012). Successful technology leadership requires change in the behavior of the administrator (Richardson & McLeod, 2011). The administrators’ proficiency in technology leadership is vital to the school (Chang, 2012).

Iman (as cited in Gulcan, 2012) defined leadership as “the power to influence others and lead them to action in line with certain goals and targets” (p. 625). Calik (as cited in Gulcan, 2012) defined leadership as “being a source of inspiration to others and guiding them while being the stimulating power of the change in the organization as well as solving the problems” (p. 625). Leaders are motivators, influencers, guides, and role models (Afshari et al., 2009; Gulcan, 2012; Lavery & Hine, 2013).
Chang, Chin, and Hsu (2008) defined technology leadership as the “application of leadership skills necessary for school leaders to help their institution apply technology in beneficial ways and prepare their schools for the 21st Century” and “the ability to develop and articulate a vision of how technology can produce change” (p. 241). They defined the technology leader as, “one who leads the school in improvement on restructuring, and uses emerging technologies as the core resources for educational change” (p. 241). Cakir (2012) defined the technology leader as an encourager of learning, communicator, securer of the learning environment, problem solver, sharer of responsibilities and presenter of information. Chang et al. (2008) noted that technology leaders must be change agents and look for advancements with technology and new technology innovations. They noted that technology leaders should “identify the connections among technology, school vision, school mission, and educational policy” (p. 230). As the technology leader, the administrator should have a vision and implement a technology plan (Chang et al., 2008; Cakir, 2012). They should encourage staff development in technology; advocate for technology support, support the adequate use of technology, and evaluate school and district technology plans (Chang et al., 2008).

According to Cakir (2012), technology leaders exist to “develop a joint vision, secure cooperation and provide the necessary underlying conditions for the effective use of technology in schools” (p. 275). Additionally, they should be “sources of inspiration and leadership in the implementation of the organization’s shared vision and the effective integration of technology for personal development” (p. 279). A study by Ertmer et al. (2002) stated that technology leaders should act as a role model, provide encouragement and direction and share knowledge and information.
Due to the advancement of technology, schools need administrators who are technology leaders and are willing to change existing paradigms (Richardson et al., 2013). Creighton (2003) noted that because technology is omnipresent, we must include leadership in technology. Chang (2012) asserted that technology leadership is vital. Garcia and Abrego (2014) suggested that technology leadership is a must to sustain and improve student achievement. Anderson and Dexter (2005) continued, “technology leadership play[s] a very central, pivotal role in technology-related outcomes” (p. 74). Afshari et al. (2012) wrote that administrators are given technology leadership responsibilities but fail due to lack of knowledge, training and confidence. Garcia (2014) noted that “many [administrators] are not prepared for their new role as technology leaders, and therefore, struggle to evaluate both the instructional and technical resources necessary to realize exemplary student achievement” (p. 13). Richardson and McLeod (2011) continued and noted that administrators are unclear of their role in becoming an effective technology leader.

Administrators must “plan carefully in preparing students for the digital society that exists already and is dramatically changing the future” (Garland, 2010, p. 48). McLeod and Richardson (2011) wrote, “preparing future-ready citizens who are technology savvy, globally competent and prepared to engage in a 21st-century knowledge-based economy with applicable skills requires a school leader who is prepared to lead changes in schooling, as catalyzed by technology and its ubiquitous presence” (p. 216). Knowledge and implementation of technology standards allow administrators to foster school environments that are technology rich.
If schools are to become digital learning institutions, there must be technology leadership that embraces new challenges and accepts new opportunities. The integration of technology depends on administrators who are able to implement change in schools (ISTE, 2011b). For schools to be technologically successful, they must be led by administrators who know and can implement technology correctly. Donlevy (2004) stated that administrators need a “variety of competencies and skills” (p. 213). If administrators want to be considered 21st Century leaders who can lead technology-infused schools, knowledge and use of standards cannot be ignored (Richardson et al., 2012). The standards are a map for administrators to use in their implementation of technology and its success in the schools. Therefore, it is important to evaluate administrators’ perceived knowledge, importance and perceptions of the standards.

**Education and Standards**

Accountability has been at the forefront of education (Loveland, 2012). “The term almost always concerns systems of expectations, rewards, and sanctions that surround the school and originate outside of it” (Louis et al., 2012, p. 666-667). Just the term “accountability is likely to conjure up images of system-wide arrangements for ensuring the proper expenditure of public funds and for encouraging or even compelling [administrators] to improve their performance to acceptable levels” (Louis et al., 2012, p. 666). According to Louis et al. (2012), “curriculum standards and test-based accountability have become staples, perhaps even taken for granted, in the educational sector” (p. 541). Accountability’s importance has now filtered into the school and classrooms (Banister & Reinhart, 2013; Loveland, 2012; Wodarz, 2002). Accountability was initiated over three decades ago by the National Commission on Excellence in
Education release of a report entitled *A Nation at Risk* (Chang, 2012; Loveland, 2012). The report called for school reform which led to the development of standards (Guthrie & Sanders, 2001; Wildy, Pepper, & Guanzhong, 2011). *A Nation at Risk* stressed the importance of students increasing their technology literacy (Chang, 2012). Since its inception, a plethora of policies, plans and standards have been initiated in schools (Chang, 2012).

Standards are statements that describe what one should know and be able to do (e-lead, n.d.). Kurt et al. (2008) defined standards as the “skills and information” one should have. They are used to measure success (Hilliard & Jackson, 2011; Rucker-Cortez et al., 2012). Proficiency in standards is often linked to school success (Richardson et al., 2012). Richardson et al. (2012) continued and wrote that standards provide a framework for effective evaluation and improving professional practice. Banoglu (2011) wrote that standards are “scientifically well-defined dimensions” that may be used as an evaluation measure (p. 208).

Standards have the potential to influence policy and practice (Reed & Llanes, 2010). They should be the basis of any program (e-lead, n.d.). They should align with certifications, promotions, and tenure (Richardson et al., 2012). Standards alone do not necessitate student improvement. Standards are more effective when they are “part of a system that involves reflective practice, capacity building, accountability, and continuing revision of the standards” (McCampbell, 2001, p. 69).

Standards have been used to develop instruments that evaluate success; they have been created and implemented in many aspects of education (Bergacs, 2008). Additionally, they have been created to provide unity amongst educational technologies
and the educational process (Kurt et al., 2008). There are standards for students, teachers, administrators, and many other entities. In addition to standards for general education, there are standards that are more specific for different areas of interest such as administration.

**Technology Standards for School Administrators**

About 20 years ago, there was not a clear explanation of administrators’ roles with technology. However, it was understood that the administrator was at the head of technology and its integration in the learning process. Subsequently, many organizations created standards to help with the changing role of the administrator (Yu & Durrington, 2006). In 1998, 10 educational associations met together and formed the National Policy Board for Educational Administration (NPBEA). The NPBEA’s task was to create standards for school administrators (Richardson et al., 2012). Also, in 1994 the NPBEA created the Interstate School Leaders Licensure Consortium. It was comprised of a group of Chief State School Offices. They released standards for school administrators in 1996; the standards provided a brief set of expectations needed to effectively lead a school (Rieckhoff, 2014). During the same time, the Educational Leadership Constituent Council revealed a set of guidelines that were more applicable to universities. Later, the Educational Leadership Constituent Council created the Educational Leadership Constituent Council Standards to be used in preparation programs (Richardson et al., 2012). Later in 1994, Clinton and his administration launched Goals 2000 (Franklin & Bolick, 2007). Goals 2000 included a National Education Standards and Improvement Council that was tasked with assessing national and state standards and assessments (Franklin & Bolick, 2007). Then, there was the *No Child Left Behind Act* of 2001 that
required states to create standards and assessments for math, reading and science. In addition, states were to create accountability measures for schools regarding the standards and assessments (Franklin & Bolick, 2007). During the past 30 years, there have been many groups and organizations that have developed standards that may be used as an accountability measure. One group was the ISTE. The ISTE chose to develop “standards that focused exclusively on the technology needs of school administrators” (Richardson et al., 2012, p. 132).

**ISTE Standards** Over 35 years ago, the ISTE was created as a non-profit organization. Their purpose was to functionalize and standardize the use of educational technologies in the USA. The ISTE provided leadership and created resources geared at increasing the effective use of educational technologies amongst administrators and within the teaching and learning process (Kurt et al., 2008). A major accomplishment of the ISTE was when the ISTE Accreditation and Professional Standards Committee initiated the National Educational Technology Standards in 1993 (Kelly & McAnear, 2002). This initiation was funded by the US Department of Education, NASA, Apple and the Millken Exchange on Education Technology (Roblyer, 2000). That initiation was completed by the Collaborative for Technology Standards for School Administrators (TSSA; Donlevy, 2004). The TSSA was a group of individuals and organizations chaired by James Bosco, an employee in the College of Education at Western Michigan University (Donlevy, 2004). The contributors, supporters and participants were instrumental in the development of the standards for ISTE (Donlevy, 2004). They aimed to develop national standards and criterion regarding the use of technology in education (Kurt et al., 2008). The ISTE provides a family of standards that stem from the National
Education Technology Standards (NETS). These standards coexist to improve education. In June 1998, the first NETS standard for students were released (Roblyer, 2000). In 2000, the NETS for Teachers (NETS-T) were released. In 2001, the NETS for Administrators (NETS-A) were released (Brooks-Young, 2002). The NETS listed the roles of students, teachers, administrators, coaches, and computer science teachers and technology use in the school (ISTE, 2011). NETS are “standards for learning, teaching, and leading in the digital age and are widely recognized and adopted worldwide” (ISTE, 2011a, para 2). In addition, the NETS “set a standard of excellence and best practices in learning, teaching, and leading with technology in education” (para 4). The standards “standardized the qualifications and proficiencies that teachers, students and school principals should have regarding educational technology use” (Eren & Kurt, 2011, p. 626). NETS, with its dimensions for teachers (Kiranli and Yildirim (2013) explained that the NETS were created to improve learning outcomes in the United States by developing standards for technology use and to evaluate technology use (Kiranli & Yildirim, 2013). However, for the NETS to be implemented at the student, teacher, and coach levels, administrators must be knowledgeable of the NETS.

**ISTE Standards-A** As stated above, the ISTE developed the first NETS-A in 2001. Those standards contained subtitles: (a) Leadership and Vision; (b) Learning and Teaching; (c) Productivity and Professional Practice; (d) Support, Management and Improvement; (e) Assessment and Evaluation; and (f) Social, Legal, and Ethical Issues (ISTE, 2002). All steps of the education process were considered in the development of the standards (Şirin & Duman, 2013). The NETS-A “represent[ed] a national consensus of the things P-12 school administrators need[ed] to know and do to effectively support
technology integration” (Brooks-Young, 2002, p. 4). They were developed by the ISTE in an effort to elaborate on the skills and qualifications administrators should have in regard to technology in schools (Garcia & Abrego, 2014; Şirin & Duman, 2013).

According to Richardson et al. (2012), the standards were developed to help administrators understand and improve their additional title as technology leader. The NETS-A were “standards for evaluating the skills and knowledge school administrators and leaders need[ed] to support digital age learning, implement technology, and transform the instruction landscape” (ISTE, 2011b, para. 4). Kurt et al. (2008) recorded that the NETS-A were “proficiencies that administrators, who have an important role in education process, should have for the use of educational technologies” (p. 2). According to Eren and Kurt (2011), the goal of the NETS-A was to

…train school [administrators] who have understood the school model in information society to start, implement, and manage the changes in schools; who can meet the complex needs of schools via technological resources; who can find ways to increase the productivity in the new structure of the school; and who can take decisions regarding the future of the institution. (p. 626)

Coklar (as cited in Kiranli & Yildirim, 2013) commented that the standards in whole or part have been adopted, implemented or adapted in all states except one. Additionally, the standards have been adopted in other countries worldwide (Healey, 2015; Şirin & Duman, 2013). According to Baf, Radetić–Paić, and Zarevski (2013), the standards should be evident in all schools.

Since the inception of the original standards there have been revisions. The revisions have been caused by the increasing role that technology plays in today’s
society. The first set of standards for administrators were developed in 2001 by the Technology Standards for School Administrators Collaborative and adopted by ISTE-NETS (Brooks-Young, 2002). In 2009 the standards were renamed to the ISTE Standards-A and redefined and include the following five themes and definitions:

- **Visionary Leadership**: Educational Administrators inspire and lead development and implementation of a shared vision for comprehensive integration of technology to promote excellence and support transformation throughout the organization.

- **Digital Age Learning Culture**: Educational Administrators create, promote, and sustain a dynamic, digital-age learning culture that provides a rigorous, relevant, and engaging education for all students.

- **Excellence in Professional Practice**: Educational Administrators promote an environment of professional learning and innovation that empowers educators to enhance student learning through the infusion of contemporary technologies and digital resources.

- **Systemic Improvement**: Educational Administrators provide digital age leadership and management to continuously improve the organization through the effective use of information and technology resources.

- **Digital Citizenship**: Educational Administrators model and facilitate understanding of social, ethical and legal issues and responsibilities related to an evolving digital culture (ISTE, 2009, pp. 1-2).

Those standards and themes identified “skills and knowledge that all school administrators should have to become effective leaders in technological applications”
Each of the five standards is further broken down into performance indicators with points for implementation (Richardson et al., 2015). These are the current ISTE Standards-A and are a major component of this study. Not only are perceptions of the national standards important, but also are perceptions of the state technology standards.

**VTSIP** The VDOE is a national leader in technology usage (VDOE, 2012a). They have initiated many technology initiatives that support instruction and accountability in public schools. The VTSIP is one initiative directed towards personnel.

In 1995, the Virginia Board of Education (VBOE) requested that the Advisory Board on Teacher Education and Licensure study and recommend proficient technology requirements for educators. Three years later the VTSIP were introduced (Knestis, 2003). The VTSIP were adopted by the VBOE in 1998 (Knestis, 2003; "Technology Standards," 1999). Provisions required schools to validate that personnel were proficient in the use of technology by 2002 ("Technology Standards," 1999). State law mandated that the VBOE alter its licensure requirements to include that on or after July 1, 2003, those seeking licensure as a new applicant or renewal applicant must demonstrate proficiency in the use of technology (Knestis, 2003; "Technology Standards," 1999). Currently, there are eight technology standards in which instructional personnel must demonstrate proficiency ("Technology Standards," 1999). Those standards have been adopted by the VBOE ("Technology Standards," 1999). However, the VBOE delegated the schools to detail tasks that satisfied the proficiency of the standards (Knestis, 2003; "Technology Standards," 1999).
The VTSIP “emphasize proficiency in the use of technology to enhance teaching and learning in all content areas” (VDOE, 2012b, para. 1). Charlottesville County Schools noted that proficiency in TSIP supports learning and efficient operation of schools ("Technology Standards," 1999). The eight standards of the VTSIP are as follows:

Instructional personnel shall be able to:

- demonstrate effective use of a computer system and utilize computer software.
- apply knowledge of terms associated with educational computing and technology.
- apply computer productivity tools for professional use.
- use electronic technologies to access and exchange information.
- identify, locate, evaluate, and use appropriate instructional hardware and software to support Virginia's Standards of Learning and other instructional objectives.
- use educational technologies for data collection, information management, problem solving, decision making, communication, and presentation within the curriculum.
- plan and implement lessons and strategies that integrate technology to meet the diverse needs of learners in a variety of educational settings.
- demonstrate knowledge of ethical and legal issues relating to the use of technology (Technology Standards, 1998, para. 1-8).
Standards and Technology Leadership Studies

There have been numerous theories and studies that focus on the National Educational Technology Standards for Administrator (NETS-A), although there have been updates and changes to those standards since they were first initiated in 2001 (Richardson et al., 2012). Richardson et al. (2012) conducted a literature review that focused on the 2009 updated NETS-A and technology leadership. They reviewed 37 articles. After they analyzed these articles, they found many of the articles were project descriptions and not empirical studies. Only 6 of the 37 articles focused completely on the NETS-A’s five standards (Richardson et al., 2012). When technology leadership was added as a search criterion, the number of returned articles was less. McLeod and Richardson (2011) reviewed 43 articles focused on technology leadership; only 2 of those focused on technology standards. Therefore, more research related to technology standards and leadership with a focus on competencies is needed.

Banoglu (2011) administered the Principals’ Technology Leadership Assessment (PTLA), which is an assessment aligned with the NETS-A. His study revealed that technology leadership competence varied based on gender in that females performed significantly better in the Leadership and Vision themes. However, when Brunson (2015) administered the PTLA, she found that gender had no effect on technology leadership competence. Brunson also studied the effect of years of experience on technology leadership competence, and found that their years of experience do affect leadership competence. Duncan (2011) also studied administrators’ technology leadership and engagement by administering the PTLA. When he tested the PTLA by demographics, he found no significant difference in gender. Also through his administration of the PTLA,
Duncan (2011) found that administrators failed to meet the Leadership and Vision and Assessment and Evaluation standards while Productivity and Professional Practice was met with the highest mean score. When Duncan tested the PTLA by the demographic, years as an educator, he found no significant difference. However, a significant difference was found between the PTLA and school level. Curnyn (2013) also administered the PTLA and found that administrators self-reported that they moderately met the 2002 NETS-A. Administrators rated themselves the highest on Productivity and Professional Practice and the least on Leadership and Vision. She found no significant differences between the standards and the demographics: gender, age, years of experience, grade level or degree earned.

Cummings (2012) designed her survey based on the ISTE NETS-A and performance indicators. After administering her survey, she found that administrators rated themselves on proficiency of the NETS-A the highest on Leadership and Vision and the least on Assessment and Evaluation. She also found that administrators rated themselves on importance of the NETS-A the highest on Leadership and Vision and the least on Social, Legal and Ethical Issues.

Townsend (2013) conducted a qualitative study on technology leadership. One research question of the study focused on administrators and their approach to technology leadership as evidenced by responses to questions about the NETS-A. Based on the responses of the participants, Townsend (2013) concluded that administrators’ technology practices were aligning with the NETS-A.

As noted in studies above, there are studies that examine technology leadership, perceptions of technology, and technology standards separately. However, none of them
specifically examine administrators’ perceptions of technology standards, although prior research shows that leadership is vital when it comes to technology and the education environment (Afshari et al., 2009; Anderson & Dexter, 2005). In the school, administrators are the first ones held accountable for any successes or failures; technology successes and failures are not different. Additionally, technology acceptance is limited to what the administrator is familiar or comfortable with (Lim, Grönlund, & Andersson, 2015). As new technologies are developed and infiltrated more into the educational realm, administrators are forced to positively support technology (DiVall et al., 2013). Anderson and Dexter (2005) concurred that if technology is to be successfully implemented into the educational realm, technology leadership is a necessity. Technology’s potential will not be understood without the support of the administrators of the schools (Schiller, 2003). An increase in literature on technology leadership in relation to technology standards could impact technology growth and potential in the educational realm as well as student learning and success (Richardson et al., 2012). Based on these findings, more research that focuses on technology standards for administrators as they focus on being technology leaders is needed (Richardson et al., 2012).

Curriculum rooted in a standards based project leads to effective student learning (Loveland, 2012). Curriculum linked with standards in technology leads to increased technology literacy (Loveland, 2012). The application of the technology standards leads to improved educational opportunities (Baf et al., 2013). Without competency in national and state technology standards and an appropriate foundation in technology knowledge and skills, misinformed technology judgments will made by the administrators (Garcia &
Abrego, 2014). When administrators incorporate the components of the ISTE Standards- 
A and the VTSIP in their administrator duties as technology leaders, they will foster 
schools that are successful (e-lead, n.d.).
CHAPTER III
METHODOLOGY

The purpose of the study was to determine administrators’ self-assessed perceived knowledge, importance, and perceptions of the ISTE Standards-A and the VTSIP. Additionally, their demographic variables were examined. This chapter is divided into the following sections: (a) Research Design, (b) Population, (c) Instrumentation, (d) Variables of the Study, (e) Data Collection and Procedures, and (f) Data Analysis.

Research Design

The designs of the study were descriptive and causal comparative. Descriptive designs examine existing circumstances exclusive of analyzing interactions between variables (Fraenkel & Wallen, 2006). In causal comparative designs “the researcher attempts to determine the cause, or reason, for existing differences in the behavior or status of groups of individuals” (Gay, Mills, & Airasian, 2006, p. 217). This study examined administrators’ knowledge, importance and perceptions of the ISTE Standards-A and the VTSIP. It also examined if there was a relationship between the ISTE Standards-A and the VTSIP. Lastly, the study examined if there were differences between the administrators’ perceptions of the ISTE Standards-A by select demographic variables and differences between the administrators’ perceptions of the VTSIP by select demographic variables. Therefore, descriptive and causal comparative designs were appropriate for the study.
Survey research, a category of descriptive design, was used to collect the data in this study. Survey research is one of three ways to complete descriptive research. Literature reveals that surveys are used to verify or explain why things are the way they are and also compare how subgroups view topics and/or issues (Gay & Airasian, 2003). Surveys describe and summarize attributes of groups through questionnaires (Fraenkel & Wallen, 2006). They also evaluate attitudes, procedures, preferences, opinions, demographics, and practices (Gay & Airasian, 2003). The questions on a survey help to evaluate beliefs, knowledge and/or positions on different topics (Fraenkel & Wallen, 2006). In this study, a self-report survey was administered to participants seeking to describe the characteristics of participating school administrators and their perceived knowledge, importance and perceptions toward the national and state technology standards.

**Research Questions**

The study focused on administrators’ perceived knowledge, importance, and perceptions of the ISTE Standards-A and the VTSIP. This study was designed to answer the following questions:

1. How do administrators perceive their knowledge of the ISTE Standards-A and VTSIP?
2. How do administrators perceive the importance of the ISTE Standards-A and VTSIP?
3. What are administrators’ perceptions of the ISTE Standards-A and VTSIP?
4. Is there a statistically significant difference in administrators’ perceptions of the ISTE Standards-A and administrators’ perceptions of the VTSIP?
5. Is there a statistically significant difference between the administrators’ perceptions of the ISTE Standards-A and by select demographic variables: (a) age, (b) current administrator title, (c) current level of administration (elementary/middle/high), (d) gender, (e) ethnicity, (f) highest degree completion, (g) years in administration and (h) region?

6. Is there a statistically significant difference between administrators’ perceptions of the VTSIP and by select demographic variables: (a) age, (b) current administrator title, (c) current level of administration (elementary/middle/high), (d) gender, (e) ethnicity, (f) highest degree completion, (g) years in administration and (h) region?

**Population**

The VTSIP were one section of the survey. Therefore, administrators in Virginia were used as they would be the most familiar with the state standards that were being researched. The population for this study was members of the Virginia Association of Elementary School Principals and the Virginia Association of Secondary School Principals in spring semester of 2017. There were 342 administrators who were eligible to participate in this study, as a member of the Virginia Association of Elementary School Principals or the Virginia Association of Secondary School Principals, and all were invited to participate in the study. After follow-up surveys were sent, there were 43 completed surveys returned and those 43 people who completed the survey were used as the population of the study.
Instrumentation

A survey instrument (Appendix A) was developed by the researcher to examine administrators’ knowledge, importance and perceptions of the ISTE Standards-A and the VTSIP. The survey was based on the ISTE Standards-A and the VTSIP. It also contained demographic questions and statements. Permission to use the ISTE Standards-A as a guide in developing the survey was obtained from the ISTE. The VTSIP are public record and are available for use in a study. The VTSIP are found under 8VAC20-25-30 in the Code of Virginia (8VAC20-25-30).

The survey was divided into eight sections. Section one began with a welcome and short explanation of the purpose. Sections two through six of the survey instrument were based on the ISTE Standards-A and were used to gather participants’ perceived knowledge, importance and perceptions of the ISTE Standards-A. There were five themes with performance indicators about each standard below it along with one statement seeking questions, comments, or concerns about the standards. The themes were: Visionary Leadership, Digital Age Learning Culture, Excellence in Professional Practice, Systematic Improvement, and Digital Citizenship. Section seven of the survey instrument was based on the VTSIP and was used to gather participants’ perceived knowledge, importance and perceptions of the VTSIP. The final section of the survey instrument was used to gather demographics of the participants. Participants were to mark their responses using the given categories or type their response in the provided text box. The demographics were (a) age, (b) current administrator title, (c) current level of administration (elementary/middle/high), (d) gender, (e) ethnicity, (f) highest degree completion, (g) years in administration and (h) region.
Sections two through six of the survey consisted of 27 statements. The first 26 statements were related to the administrators’ perceived knowledge and importance of the ISTE Standards-A. Specifically, participants responded to 26 statements in sections two through six, excluding section six statement f related to the five themes of the ISTE Standards-A: a) Visionary Leadership, b) Digital Age Learning Culture, c) Excellence in Professional Practice, d) Systematic Improvement, and e) Digital Citizenship. Each of the 26 statements consisted of two parts: one part querying the administrators’ perceived level of knowledge (IPK) of the indicator and the other part querying the perceived importance (IPI) of the indicator within his or her practice. Thus, participants were required to respond to 52 statements, and mark their responses on the provided Likert scale for each item. The Likert Scale consisted of degrees from strongly disagree to strongly agree and absent to excellent. Section six, statement f was open-ended and allowed participants to add any questions, comments, or concerns that they had about the ISTE-Standards A.

Section seven of the survey consisted of nine statements. The first eight statements related to the administrators’ perceived knowledge and importance of the VTSIP. Specifically, participants responded to eight statements in section seven, excluding statement i, related to technology standards set forth by the VDOE. Each of the eight statements consisted of two parts: one part querying the administrators’ perceived level of knowledge of the standard (VPK) and the other part querying the perceived importance of the standard (VPI) within his or her practice. Thus, participants were required to respond to 16 statements, and mark their responses on the provided Likert scale for each item. The Likert Scale consisted of degrees from strongly disagree to strongly agree and absent to excellent.
strongly agree and absent to excellent. Section seven, statement i was open-ended and
allowed participants to add any questions, comments, or concerns that they had about the
VTSIP.

In sections two through seven, participants were asked to choose their level of
knowledge of the indicators and standards and respond using the following Likert scale
ranges: absent, poor, average, good, or excellent. Participants were also asked to choose
the level of agreeance with the level of importance in their practice of the indicators and
standards using the Likert scale ranges: strongly disagree, disagree, neutral, agree, and
strongly agree. As noted above, the statements in sections two through seven, excluding
the last statements in sections six and seven, were Likert items. Likert items are popular
in educational research. Each Likert item contained five levels of responses so that
participants had an option of uncertainty when rating their opinion on the statements. A
Likert item is used to measure a person’s agreement or disagreement with a statement or
questions (Markusic, 2009). On the survey, participants clicked the circle next to the box
that corresponded to their level of agreement, disagreement or uncertainty.

Section eight of the survey consisted of eight statements relating to demographics.
Specifically, participants responded to eight statements in section eight relating to: age,
current administrator title, current level of administration, ethnicity, gender, highest
degree completion, years in administration and region. Participants marked their
responses using the given categories or typed their response in the provided text box.

The survey used in the study was created in a web format. The web format was
hosted online through a survey creator. Web surveys are becoming more popular and
have their advantages including “shorter transmission time, lower delivery cost, more
design options, and less data entry time” (Fan & Yan, 2010, p. 132). Other advantages include the possibility of missing data is reduced and there is a possibility that data is interactive (Gall, Gall, & Borg, 2003).

Validity and Reliability of the Instrumentation

Validity is described as the ability of the instrument to measure what it is intended to measure (Creswell, 2012). To ensure content validity, the survey was constructed using the ISTE Standard-A and the VTSIP. The researcher used a panel of experts to ensure the face validity so that the survey appeared to measure what it was supposed to measure. The panel also helped review the survey for consistent meaning and appropriate wording.

Reliability is described as the ability of the instrument to consistently produce comparable scores (Creswell, 2012). To estimate the reliability of the survey, a pilot study was administered in this study, and data from the pilot study was collected, coded and analyzed in this study. A Cronbach’s Alpha was used to estimate the internal consistency of the rating scale scores. There are some commonly accepted guidelines for describing internal consistency Cronbach Alpha levels: $a \geq .90$ indicates excellent internal consistency, $.90 > a \geq .80$ indicates good internal consistency, $.80 > a \geq .70$ indicates acceptable internal consistency and $.70 > a \geq .60$ indicates questionable internal consistency. The reliability factor was calculated and reported for each variable. The reliability of the instrument was based on a Cronbach’s alpha of $a \geq .70$ to establish an acceptable internal consistency. The consistency level for each section of the instrument is displayed below in Table 1.
Table 1

Distribution of Cronbach Alpha Levels by Survey Section

<table>
<thead>
<tr>
<th>Section</th>
<th>Section Title</th>
<th>Alpha Level</th>
<th>Number of Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>Visionary Leadership (k)</td>
<td>.85</td>
<td>4</td>
</tr>
<tr>
<td>II</td>
<td>Visionary Leadership (i)</td>
<td>.74</td>
<td>4</td>
</tr>
<tr>
<td>III</td>
<td>Digital Age Learning Culture (k)</td>
<td>.79</td>
<td>6</td>
</tr>
<tr>
<td>III</td>
<td>Digital Age Learning Culture (i)</td>
<td>.79</td>
<td>6</td>
</tr>
<tr>
<td>IV</td>
<td>Excellence in Professional Practice (k)</td>
<td>.89</td>
<td>5</td>
</tr>
<tr>
<td>IV</td>
<td>Excellence in Professional Practice (i)</td>
<td>.93</td>
<td>5</td>
</tr>
<tr>
<td>V</td>
<td>Systematic Improvement (k)</td>
<td>.96</td>
<td>6</td>
</tr>
<tr>
<td>V</td>
<td>Systematic Improvement (i)</td>
<td>.84</td>
<td>6</td>
</tr>
<tr>
<td>VI</td>
<td>Digital Citizenship (k)</td>
<td>.88</td>
<td>5</td>
</tr>
<tr>
<td>VI</td>
<td>Digital Citizenship (i)</td>
<td>.93</td>
<td>5</td>
</tr>
<tr>
<td>VII</td>
<td>VTSIP (k)</td>
<td>.89</td>
<td>8</td>
</tr>
<tr>
<td>VII</td>
<td>VTSIP (i)</td>
<td>.94</td>
<td>8</td>
</tr>
</tbody>
</table>

(k) = knowledge, (i) - importance

Pilot Study

A pilot study of the survey was administered in this study. Conducting a pilot allowed the researcher to recognize unexpected issues or problems. Additionally, the analysis of the pilot study was used to establish validity and reliability of the instrument (Gay & Airasian, 2003). The consistency of the results from the survey established the reliability of the survey instrument. Additional space was given on the survey for participants in the pilot study to make comments and recommendations for improving the survey instrument. They were also to make notes about questions or statements that were not clear and other items that needed clarity or rewording. Responses were reviewed and no adjustments were necessary.
Variables of the Study

The study included the following variables:

1. perceived knowledge of visionary leadership,
2. perceived importance in practice of visionary leadership,
3. perceived knowledge of digital age learning culture,
4. perceived importance in practice of digital age learning culture,
5. perceived knowledge of excellence in professional practice,
6. perceived importance in practice of excellence in professional practice,
7. perceived knowledge of systematic improvement,
8. perceived importance in practice of systematic improvement,
9. perceived knowledge of digital citizenship,
10. perceived importance in practice of digital citizenship,
11. perceived knowledge of the ISTE Standards-A,
12. perceived importance in practice of the ISTE Standards-A,
13. perceived perception of the ISTE Standards-A,
14. perceived knowledge of the VTSIP,
15. perceived importance in practice of the VTSIP,
16. perceived perception of the VTSIP, and
17. demographics: (a) age, (b) current administrator title, (c) current level of administration (elementary/middle/high), (d) gender, (e) ethnicity, (f) highest degree completion, (g) years in administration, and (h) region.

The first 16 variables listed are ordinal variables. For the demographic variables, age and years in administration are interval variables. Current administrator title, current level of
administration, and highest degree completion are ordinal variables. Ethnicity, gender, and region are categorical variables.

The dependent variables used in the study were (a) administrators’ perceived level of knowledge of the ISTE Standards-A, (b) administrators’ perceived importance in practice of the ISTE Standards-A, (c) administrators’ perceptions of the ISTE Standards-A, (d) administrators’ perceived level of knowledge of the VTSIP, (e) administrators’ perceived importance of the VTSIP and (f) administrators’ perceptions the VTSIP.

The independent variables used in the study included the demographic variables: (a) age, (b) current administrator title, (c) current level of administration (elementary/middle/high), (d) gender, (e) ethnicity, (f) highest degree completion, (g) years in administration and (h) region.

**Data Collection and Procedures**

The researcher completed Institutional Review Board (IRB) training from Mississippi State University on May 16, 2015. In order to move forward with the study, the researcher received approval from university’s IRB. She completed all components of the IRB application with attachments such as the researcher’s background information, consent form, research protocol, survey instrument, phone protocol, investigator’s assurance and explanation of study for participants. Upon approval November 29, 2016, by the university’s IRB for the use of Protection of Human Subjects, the researcher preceded with conducting the pilot study. A copy of the approval letter is attached as Appendix B.

To conduct the pilot study, the researcher gained permission from the superintendent of District A to conduct a pilot study using administrators of her district.
(See Appendix C). District A is a suburban public school setting in the eastern part of the state. The researcher asked the superintendent’s designee to provide a link to the web survey so that the administrators would be able to complete the survey. The email contained a cover letter and link to the survey (see Appendix D). The cover letter contained the following: a) directions of how to complete the survey, b) a guarantee of confidentiality, and c) an invitation to critique and analyze the survey to make it better. The link was only sent to administrators chosen to participate in the pilot study. The link was sent to 10 administrators, conveniently selected and eight responded. According to Patten (2012), pilot studies use small sample sizes of 10 to 100. Participants had one week to respond to the pilot study. Within a week of receiving feedback, the data from the survey instrument was analyzed using IBM Statistical Package for the Social Sciences software and no updates were necessary. All questions and statements were answered and remained on the survey. Within one week of finalizing the analysis of the pilot study and making the necessary updates, the survey was made available to participants of the survey.

To begin the study, the researcher called and wrote to the Executive Directors of the Virginia Association of Elementary School Principals and the Virginia Association of Secondary School Principals seeking permission to conduct the study using members of their associations. Letters of permission are included as Appendices E and F. An email including the cover letter, letter of consent and survey link was sent electronically to the Executive Directors to forward to their members (see Appendix G). After two weeks from the initial emailing of the survey link, the directors sent an email reminder of the survey as a follow up to the non-respondents. After three weeks from the initial emailing
of the survey link, a final follow-up email was sent to non-respondents. Therefore, there were two follow-up email reminders following the initial email of the survey. The cover letter briefly described the study. The letter of consent form addressed the purpose of the study, the risk involved, the benefits that may result from the study, confidentiality and anonymity of information in the survey, and other questions the participants might have. Completing the survey showed that participants gave their consent to participate. Upon receiving the responses, the researcher printed a hard copy and locked it away in a file cabinet and then saved the survey responses to a folder on her personal laptop computer. Once the surveys had been received, the hard copy data were shredded and the folder on her computer was saved to a flash drive, the flash drive was locked away in a safe, and statistical data analysis began.

**Data Analysis**

Data analysis included descriptive and inferential statistics. Descriptive statistics used were means and standard deviations. Inferential statistics used were analysis of variance (ANOVA) and t-tests. ANOVAs and t-tests were used at the $\alpha = .05$ level. This level was chosen as it is the most common level of significance used in educational research (Fraenkel & Wallen, 2006; Gall et al., 2003).

The survey data were analyzed using IBM SPSS. The statistical analysis that was used to answer each research question based on the survey instrument is discussed in detail in the subsequent paragraphs.

Descriptive statistics (mean scores and standard deviations) were used to determine how strongly administrators’ perceptions of their own practices reflect the ISTE Standards-A and the VTSIP. As shown in Table 2, a mean score of $M > 4$ indicated
an excellent knowledge or perception score and a strong agreement with the importance of the standard. A mean score of $M = 3$ to $M = 4$ indicated a good knowledge or perception score and an agreement with the importance of the standard. A mean score of $M = 2$ to $M = 3$ indicated a fair knowledge or perception score and a disagreement with the importance of the standard. A mean score of $M < 2$ indicated a poor knowledge or perception score and a strong disagreement with the importance of the standard.

Table 2

*Mean Interpretation Table*

<table>
<thead>
<tr>
<th>Mean Range</th>
<th>Knowledge and Perception Interpretation</th>
<th>Importance Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2</td>
<td>Poor</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>2-3</td>
<td>Fair</td>
<td>Disagree</td>
</tr>
<tr>
<td>3-4</td>
<td>Good</td>
<td>Agree</td>
</tr>
<tr>
<td>&gt; 4</td>
<td>Excellent</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>

Perceived knowledge, importance, and perceptions of the standards was measured using the scores attained from responding to statements about the ISTE Standards-A and the VTSIP. The ISTE Standards-A is a broad document; therefore, the researcher used scores from the following five themes associated with the ISTE Standards-A: section two, Visionary Leadership (V), section three, Digital Age Learning Culture (D), section four, Excellence in Professional Practice (E), section five, Systematic Improvement (S), and section 6, Digital Citizenship (C). Each theme had four to six indicators. Each indicator received a perceived knowledge (PK) score and a perceived importance score (PI); each score was calculated by finding the mean of the PK and PI of the responses for
each indicator. Each theme also received a PK score (VPK; DPK; EPK; SPK; and CPK) and a PI score (VPI; DPI; EPI; SPI; and CPI); each of those scores was calculated by finding the mean of the responses about the PK and PI of the indicators within each theme.

The VTSIP has eight proficiencies that were treated as indicators. Therefore, there were no theme scores for the VTSIP, just indicator scores. Each score was calculated by finding the mean of the PK and PI of the responses for each indicator.

The ISTE Standards-A the VTSIP each received a perceived knowledge score (IPK and VPK) and a perceived importance score (IPI and VPI). The ISTE Standards-A scores were calculated by finding the mean of the scores about the PK and PI responses for each theme. The VTSIP scores were calculated by finding the mean of the scores about the PK and PI responses for each indicator. Additionally, each standard received a perception score (IP and VP). The IP score was computed by finding the mean of the IPK and IPI scores. The VP score was computed by finding the mean of the VPK and VPI scores. Therefore, the following 16 scores were attained:

1) Visionary leadership perceived knowledge score (VPK), the score aggregated from the average of responses to four statements in section two, statements a-d, about knowledge of visionary leadership;

2) Visionary leadership perceived importance score (VPI), the score aggregated from the average of responses to four statements in section two, statements a-d, about importance in practice of visionary leadership;
3) Digital age learning culture perceived knowledge score (DPK), the score aggregated from the average of responses to six statements in section three, statements a-f, about knowledge of digital age learning culture;

4) Digital age learning culture perceived importance score (DPI), the score aggregated from the average of responses to six statements in section three, statements a-f, about importance in practice of digital age learning culture;

5) Excellence in professional practice perceived knowledge score (EPK), the score aggregated from the average of responses to five statements in section four, statements a-e, about knowledge of excellence in professional practice;

6) Excellence in professional practice perceived importance score (EPI), the score aggregated from the average of responses to five statements in section four, statements a-e, about importance in practice of excellence in professional practice;

7) Systematic improvement perceived knowledge score (SPK), the score aggregated from the average of responses to six statements in section five, statements a-f, about knowledge of systematic improvement;

8) Systematic improvement perceived importance score (SPI), the score aggregated from the average of responses to six statements in section five, statements a-f, about importance in practice of systematic improvement;

9) Digital citizenship perceived knowledge score (CPK), the score aggregated from the average of responses to five statements in section six, statements a-e, about knowledge of digital citizenship;
10) Digital citizenship perceived importance score (CPI), the score aggregated from the average of responses to five statements in section six, statements a-e, about importance in practice of digital citizenship;

11) ISTE Standards-A perceived knowledge score (IPK), the score aggregated from the average of the theme scores as they pertain to the ISTE Standards-A knowledge scores;

12) ISTE Standards-A perceived importance score (IPI), the score aggregated from the average of the theme scores as they pertain to the ISTE Standards-A importance scores;

13) ISTE Standards-A perceived perception score (IP), the score aggregated from the average of the IPK and IPI scores as they pertain to the ISTE Standards – A;

14) VTSIP perceived knowledge score (VPK), the score aggregated from the average of responses to eight indicators in section seven, statements a-h, about knowledge of the VTSIP;

15) VTSIP perceived importance score (VPI), and the score aggregated from the average of responses to eight indicators in section seven, statements a-h, about importance of the VTSIP; and

16) VTSIP perceived perception score (VP), the score aggregated from the average of the VPK and VPI scores as they pertain to the VTSIP.

When entering data, the researcher used the number that participants selected as indicators for different levels of perception. Specifically, strongly disagree and absent were coded as one, disagree and poor were coded as two, average and neutral were coded
as three, agree and good were coded as four and strongly agree and excellent were coded as five. To begin to answer the research question, descriptive statistics such as the means, standard deviations, percentages, and frequency distribution were calculated.

*Research Question 1: How do administrators perceive their knowledge of the ISTE Standards-A and VTSIP?*

To answer research question one, administrators’ perceived knowledge of the ISTE Standards-A was computed as follows using the first 26 statements in sections two through six:

1. There were four, five-point Likert scale items that measured administrators’ perceived knowledge (VPK) of the ISTE Standards-A theme: section two, Visionary Leadership.
2. There were six, five-point Likert scale items that measured administrators’ perceived knowledge (DPK) of the ISTE Standards-A theme: section three, Digital Age Learning Culture.
3. There were five, five-point Likert scale items that measured administrators’ perceived knowledge (EPK) of the ISTE Standards-A theme: section four, Excellence in Professional Practice.
4. There were six, five-point Likert scale items that measured administrators’ perceived knowledge (SPK) of the ISTE Standards-A theme: section five, Systematic Improvement.
5. There were five, five-point Likert scale items that measured administrators’ perceived knowledge (CPK) of the ISTE Standards-A theme: section six - omit statement f, Digital Citizenship.
The descriptive statistic, mean, was used to calculate the ISTE Standards-A theme perceived knowledge scores (VPK; DPK; EPK; SPK; and CPK). The descriptive statistic, mean, was also used to calculate the ISTE Standards-A perceived knowledge score (IPK) and to further analyze the research question.

To also answer research question one, administrators’ perceived knowledge of the VTSIP was computed using the first eight statements in section seven. All eight statements were five-point Likert-scale items that measured administrators’ perceived knowledge (VPK) of the VTSIP. The descriptive statistic, mean, was used to calculate the VTSIP perceived knowledge (VPK) and to further analyze the research question.

Research Question 2: How do administrators perceive the importance of the ISTE Standards-A and VTSIP?

To answer research question two, administrators’ perceived importance of the ISTE Standards-A was computed as follows using the first 26 statements in sections two through six:

1. There were four, five-point Likert scale items that measured administrators’ perceived importance (VPI) of the ISTE Standards-A theme: section two, Visionary Leadership.
2. There were six, five-point Likert scale items that measured administrators’ perceived importance (DPI) of the ISTE Standards-A theme: section three, Digital Age Learning Culture.
3. There were five, five-point Likert scale items that measured administrators’ perceived importance (EPI) of the ISTE Standards-A theme: section four, Excellence in Professional Practice.
4. There were six, five-point Likert scale items that measured administrators’ perceived importance of the ISTE Standards-A theme: section five, Systematic Improvement.

5. There were five, five-point Likert scale items that measured administrators’ perceived importance (CPI) of the ISTE Standards-A theme: section six - omit statement f, Digital Citizenship.

The descriptive statistic, mean, was used to calculate the ISTE Standards-A theme perceived importance scores (VPI; DPI; EPI; SPI; and CPI). The descriptive statistic, mean, was also used to calculate the ISTE Standards-A perceived knowledge score (IPI) and to further analyze the research question.

To also answer research question two, administrators’ perceived importance of the VTSIP was computed using the first eight statements in section seven. There were eight, five-point Likert-scale items that measured administrators’ perceived importance (VPI) of the VTSIP. The descriptive statistic, mean, was used to calculate the VTSIP perceived importance score (VPI) and to further analyze the research question.

Research Question 3: What are administrators’ perceptions of the ISTE Standards-A and VTSIP?

To answer research question three, the descriptive statistic, mean, was used to calculate the administrators’ ISTE Standards-A perceptions score (IP). The ISTE Standards-A perceived knowledge score (IPK) and perceived importance (IPI) score were averaged together to compute the IP score.

To also answer research question three, the descriptive statistic, mean, was used to calculate the administrators’ VTSIP perception score (VP). The VTSIP perceived
knowledge score (IPK) and perceived importance (IPI) score were averaged together to compute the VP score.

**Research Question 4:** Is there a statistically significant difference in administrators’ perceptions of the ISTE Standards-A and administrators’ perceptions of the VTSIP?

To answer research question four, a t-test was computed using the IP and the VP scores attained from the first 26 statements in sections two through six and the first eight statements in section seven.

**Research Question 5:** Is there a statistically significant difference between the administrators’ perceptions of the ISTE Standards-A and by the demographics: (a) age, (b) current administrator title, (c) current level of administration, (d) ethnicity, (e) gender, (f) highest degree completion (g) years in administration and (h) region?

To answer research question five, ANOVAs and a t-test were used from data attained from the first 26 statements in sections two through six and all eight statements in section eight. ANOVAs were used to test the significance of administrators’ differences of their IP by age, current administrator title, current level of administration, ethnicity, highest degree completion, years in administration, and region. A t-test was used to examine the differences in administrators’ IP by gender.

**Research Question 6:** Is there a statistically significant difference between administrators’ perceptions of the VTSIP and by the demographics: (a) age, (b) current administrator title, (c) current level of administration, (d) ethnicity, (e) gender, (f) highest degree completion (g) years in administration and (h) region?
To answer Research Question six, ANOVAs and a t-test were used from data attained from the first eight statements in section seven and all eight statements in section eight. ANOVAs were used to test the significance of administrators’ differences of their VP by age, current administrator title, current level of administration, ethnicity, highest degree completion, years in administration, and region. A t-test was used to examine the differences in administrators’ VP by gender.
CHAPTER IV
RESEARCH FINDINGS

The purpose of the study was to determine administrators’ self-assessed perceived knowledge, importance, and perceptions of the ISTE Standards-A and the VTSIP. This chapter presents the findings of the study based on the data collected from the participants.

Research Questions

The following research questions were developed to guide the study:

1. How do administrators perceive their knowledge of the ISTE Standards-A and VTSIP?

2. How do administrators perceive the importance of the ISTE Standards-A and VTSIP?

3. What are administrators’ perceptions of the ISTE Standards-A and VTSIP?

4. Is there a statistically significant difference in administrators’ perceptions of the ISTE Standards-A and administrators’ perceptions of the VTSIP?
5. Is there a statistically significant difference between the administrators’ perceptions of the ISTE Standards-A and by select demographic variables: (a) age, (b) current administrator title, (c) current level of administration (elementary/middle/high), (d) gender, (e) ethnicity, (f) highest degree completion, (g) years in administration and (h) region?

6. Is there a statistically significant difference between administrators’ perceptions of the VTSIP and by select demographic variables: (a) age, (b) current administrator title, (c) current level of administration (elementary/middle/high), (d) gender, (e) ethnicity, (f) highest degree completion, (g) years in administration and (h) region?

Demographics

The target population for the survey was members of the Virginia Association of Elementary School Principals and the Virginia Association of Secondary School Principals. There were 342 surveys and consent forms sent via email to participants, and 43 were completed, returned, and used in the analysis of the data. The rate of return of this survey was about 13%. Data was analyzed and formatted for presentation using the IBM SPSS statistical software.

The participants responded to eight demographic questions and statements about the following: (a) age, (b) current administrator title, (c) current level of administration (elementary/middle/high), (d) gender, (e) ethnicity, (f) highest degree completion, (g) years in administration and (h) region. Below are the results of each demographic.
Age

Table 3 presents the distribution of participants by age. The ages of the participants were divided into four groups: 31-40, 41-50, 51-60 and > 60. Most of the participants were 41-50 years old. Less administrators are older than 60 (7.0%), and more administrators are age 41-50 (37.2%).

Table 3

Distribution and Percentage of Age

<table>
<thead>
<tr>
<th>Age</th>
<th>Distribution</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>31-40</td>
<td>12</td>
<td>27.9%</td>
</tr>
<tr>
<td>41-50</td>
<td>16</td>
<td>37.2%</td>
</tr>
<tr>
<td>51-60</td>
<td>11</td>
<td>25.6%</td>
</tr>
<tr>
<td>&gt; 60</td>
<td>3</td>
<td>7.0%</td>
</tr>
<tr>
<td>Prefer Not to Answer</td>
<td>1</td>
<td>2.3%</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td></td>
</tr>
</tbody>
</table>

Current administrator title

Table 4 presents the distribution and percentage of participants by current administrator title. Current administrator title consisted of assistant principal, principal, dean and other. A majority of the participants were principals (53.5%).
Table 4

Distribution and Percentage of Current Administrator Title

<table>
<thead>
<tr>
<th>Title</th>
<th>Distribution</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant Principal</td>
<td>13</td>
<td>30.2%</td>
</tr>
<tr>
<td>Principal</td>
<td>23</td>
<td>53.5%</td>
</tr>
<tr>
<td>Dean</td>
<td>1</td>
<td>2.3%</td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
<td>14.0%</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td></td>
</tr>
</tbody>
</table>

Current level of administration

Table 5 presents the distribution and percentage of participants by current level of administration. Levels of administration included elementary, middle, high and other. More than 60% of the participants were in middle or high school administration.

Table 5

Distribution and Percentage of Current Level of Administration

<table>
<thead>
<tr>
<th>Level</th>
<th>Distribution</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>12</td>
<td>27.9%</td>
</tr>
<tr>
<td>Middle</td>
<td>14</td>
<td>32.6%</td>
</tr>
<tr>
<td>High</td>
<td>13</td>
<td>30.2%</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>9.3%</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td></td>
</tr>
</tbody>
</table>

Gender

Table 6 presents the distribution and percentage of participants based on gender. Most (55.8%) of the participants were female.
Table 6

*Distribution and Percentage of Gender*

<table>
<thead>
<tr>
<th>Gender</th>
<th>Distribution</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>19</td>
<td>44.2%</td>
</tr>
<tr>
<td>Female</td>
<td>24</td>
<td>55.8%</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td></td>
</tr>
</tbody>
</table>

**Ethnicity**

Table 7 presents the distribution and percentage of participants by ethnicity. Most (83.7%) of the participants were Caucasian.

Table 7

*Distribution and Percentage of Ethnicity*

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Distribution</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>African American</td>
<td>5</td>
<td>11.6%</td>
</tr>
<tr>
<td>Caucasian</td>
<td>36</td>
<td>83.7%</td>
</tr>
<tr>
<td>Prefer Not to Answer</td>
<td>2</td>
<td>4.7%</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td></td>
</tr>
</tbody>
</table>

**Highest Degree Completion**

Table 8 presents the distribution and percentage of participants by highest degree completion. The degrees included: Master’s, Educational Specialist, Ed.D., Ph.D., and other. Over 50% of the participants earned at most a Master’s degree.
Table 8

*Distribution of Highest Degree Completion*

<table>
<thead>
<tr>
<th>Degree</th>
<th>Distribution</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master’s</td>
<td>25</td>
<td>58.1%</td>
</tr>
<tr>
<td>Educational Specialist</td>
<td>5</td>
<td>11.6%</td>
</tr>
<tr>
<td>Ed.D.</td>
<td>6</td>
<td>14.0%</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>4</td>
<td>9.3%</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>7.0%</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td>61</td>
</tr>
</tbody>
</table>

**Years in Administration**

Table 9 presents the distribution and percentage of participants by years in administration. The participants’ years in administration ranged from 2 years to 30 years. The years in administration were divided into four categories: 0-7, 8-15, 16-23, and 24-31. Over 75% of the participants have 15 years of experience or less.

Table 9

*Distribution and Percentage of Years in Administration*

<table>
<thead>
<tr>
<th>Years in Administration</th>
<th>Distribution</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7</td>
<td>14</td>
<td>32.6%</td>
</tr>
<tr>
<td>8-15</td>
<td>19</td>
<td>44.2%</td>
</tr>
<tr>
<td>16-23</td>
<td>8</td>
<td>18.6%</td>
</tr>
<tr>
<td>24-31</td>
<td>2</td>
<td>4.7%</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td>61</td>
</tr>
</tbody>
</table>
Region

Table 10 presents the distribution and percentage of participants by region. There were eight regions to choose from: Region 1, Region 2, Region 3, Region 4, Region 5, Region 6, Region 7, or Region 8. Region 2 (23.3%) and Region 4 (25.6%) had the greater number of participants.

Table 10

*Distribution and Percentage of Region*

<table>
<thead>
<tr>
<th>Region</th>
<th>Distribution</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region 1</td>
<td>5</td>
<td>11.6%</td>
</tr>
<tr>
<td>Region 2</td>
<td>11</td>
<td>25.6%</td>
</tr>
<tr>
<td>Region 3</td>
<td>5</td>
<td>11.6%</td>
</tr>
<tr>
<td>Region 4</td>
<td>11</td>
<td>25.6%</td>
</tr>
<tr>
<td>Region 5</td>
<td>4</td>
<td>9.3%</td>
</tr>
<tr>
<td>Region 6</td>
<td>2</td>
<td>4.7%</td>
</tr>
<tr>
<td>Region 7</td>
<td>3</td>
<td>7.0%</td>
</tr>
<tr>
<td>Region 8</td>
<td>2</td>
<td>4.7%</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td></td>
</tr>
</tbody>
</table>

Research Question 1

Research question one was how do administrators perceive their knowledge of the ISTE Standards-A and VTSIP?

Table 11 presents mean score results from sections two through six of the survey about administrators’ perceived knowledge of each ISTE Standards-A performance indicator and related sub-standards.
Section II: Visionary Leadership

Table 11 displays the performance indicators from the Visionary Leadership theme and descriptive statistics for each. The overall mean of 3.73 with a standard deviation of .72 indicated that administrators perceived their knowledge of Visionary Leadership as good. The results of the administrator perceived knowledge ranged from the lowest perceive knowledge on item d) advocating (M = 3.34, SD = .92) to the highest perceived knowledge on item a) development (M = 3.88, SD = .85), and on item b) facilitating stakeholders (M = 3.88, SD = .72).

Section III: Digital Age Learning Culture

Table 11 also displays the performance indicators from the Digital Age Learning Culture theme and descriptive statistics for each. The overall mean of 3.92 with a standard deviation of .84 indicated that administrators perceived their knowledge of Digital Age Learning Culture as good. The results of the administrator perceived knowledge ranged from the lowest perceive knowledge on item f) global learning communities (M = 3.45, SD = .95) to the highest perceived knowledge on items c) technology use (M = 4.15, SD = .78), and on item d) providing learner centered environments (M = 4.15, SD = .78).

Section IV: Excellence in Professional Practice

Table 11 also displays the performance indicators from the Excellence in Professional Practice theme and descriptive statistics for each. The overall mean of 3.93 with a standard deviation of .76 indicated that administrators perceived their knowledge of Excellence in Professional Practice as good. The results of the administrator perceived
knowledge ranged from the lowest perceive knowledge on item e) staying abreast research \((M = 3.80, SD = .98)\) to the highest perceived knowledge on item a) promoting professional learning \((M = 4.13, SD = .81)\).

**Section V: Systematic Improvement**

Table 11 also displays the performance indicators from the Systematic Improvement theme and descriptive statistics for each. The overall mean of 3.72 with a standard deviation of .77 indicated that administrators perceived their knowledge of Systematic Improvement as good. The results of the administrator perceived knowledge ranged from the lowest perceive knowledge on item e) establishing partnerships \((M = 3.44, SD = 1.03)\) to the highest perceived knowledge on item d) recruiting competent personnel \((M = 4.00, SD = .90)\).

**Section VI: Digital Citizenship**

Table 11 also displays the performance indicators from the Digital Citizenship theme and descriptive statistics for each. The overall mean of 4.11 with a standard deviation of .64 indicated that administrators perceived their knowledge of Digital Citizenship as excellent. The results of the administrator perceived knowledge ranged from the lowest perceive knowledge on item e) cultural understanding \((M = 3.72, SD = .81)\) to the highest perceived knowledge on item d) modeling social interactions \((M = 4.33, SD = .70)\).
Table 11

**ISTE Standards-A: Perceived Knowledge Mean and Standard Deviation**

<table>
<thead>
<tr>
<th>Standard/Performance Indicator</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>II. Visionary Leadership</strong></td>
<td>3.73</td>
<td>.72</td>
</tr>
<tr>
<td>a. Educational Administrators (EA) inspire and lead development and implementation of a shared vision for comprehensive integration of technology to promote excellence and support transformation throughout the organization.</td>
<td>3.88</td>
<td>.85</td>
</tr>
<tr>
<td>b. EA inspire and facilitate among all stakeholders a shared vision of purposeful change that maximizes use of digital-age resources to meet and exceed learning goals, support effective instructional practice, and maximize performance of district and school leaders.</td>
<td>3.88</td>
<td>.72</td>
</tr>
<tr>
<td>c. EA engage in an ongoing process to develop, implement, and communicate technology-infused strategic plans aligned with a shared vision.</td>
<td>3.82</td>
<td>.87</td>
</tr>
<tr>
<td>d. EA advocate on local, state and national levels for policies, programs, and funding to support implementation of a technology-infused vision and strategic plan.</td>
<td>3.34</td>
<td>.92</td>
</tr>
<tr>
<td><strong>III. Digital Age Learning Culture</strong></td>
<td>3.92</td>
<td>.70</td>
</tr>
<tr>
<td>a. EA create, promote, and sustain a dynamic, digital-age learning culture that provides a rigorous, relevant, and engaging education for all students.</td>
<td>3.94</td>
<td>.84</td>
</tr>
<tr>
<td>b. EA ensure instructional innovation focused on continuous improvement of digital-age learning.</td>
<td>4.02</td>
<td>.68</td>
</tr>
<tr>
<td>c. EA model and promote the frequent and effective use of technology for learning.</td>
<td>4.15</td>
<td>.78</td>
</tr>
<tr>
<td>d. EA provide learner-centered environments equipped with technology and learning resources to meet the individual, diverse needs of all learners.</td>
<td>4.15</td>
<td>.78</td>
</tr>
<tr>
<td>e. EA ensure effective practice in the study of technology and its infusion across the curriculum.</td>
<td>3.87</td>
<td>.85</td>
</tr>
<tr>
<td>f. EA promote and participate in local, national, and global learning communities that stimulate innovation, creativity, and digital age collaboration.</td>
<td>3.45</td>
<td>.95</td>
</tr>
<tr>
<td><strong>IV. Excellence in Professional Practice</strong></td>
<td>3.93</td>
<td>.76</td>
</tr>
<tr>
<td>a. EA promote an environment of professional learning and innovation that empowers educators to enhance</td>
<td>4.13</td>
<td>.81</td>
</tr>
</tbody>
</table>
Table 11 (continued)

student learning through the infusion of contemporary technologies and digital resources.

b. EA allocate time, resources, and access to ensure ongoing professional growth in technology fluency and integration. 3.84 .93

c. EA facilitate and participate in learning communities that stimulate, nurture and support administrators, faculty, and staff in the study and use of technology. 3.87 .86

d. EA promote and model effective communication and collaboration among stakeholders using digital age tools. 3.98 .87

e. EA stay abreast of educational research and emerging trends regarding effective use of technology and encourage evaluation of new technologies for their potential to improve student learning. 3.80 .98

V. Systematic Improvement

a. EA provide digital age leadership and management to continuously improve the organization through the effective use of information and technology resources. 3.80 .78

b. EA lead purposeful change to maximize the achievement of learning goals through the appropriate use of technology and media-rich resources. 3.72 .91

c. EA collaborate to establish metrics, collect and analyze data, interpret results, and share findings to improve staff performance and student learning. 3.85 1.01

d. EA recruit and retain highly competent personnel who use technology creatively and proficiently to advance academic and operational goals. 4.00 .90

e. EA establish and leverage strategic partnerships to support systemic improvement. 3.44 1.03

f. EA establish and maintain a robust infrastructure for technology including integrated, interoperable technology systems to support management, operations, teaching, and learning.

VI. Digital Citizenship

a. EA model and facilitate understanding of social, ethical and legal issues and responsibilities related to an evolving digital culture. 4.11 .80

66
Table 11 (continued)

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b. EA ensure equitable access to appropriate digital tools and resources to meet the needs of all learners.</td>
<td>4.13</td>
</tr>
<tr>
<td></td>
<td>c. EA promote, model and establish policies for safe, legal, and ethical use of digital information and technology.</td>
<td>4.26</td>
</tr>
<tr>
<td></td>
<td>d. EA promote and model responsible social interactions related to the use of technology and information.</td>
<td>4.33</td>
</tr>
<tr>
<td></td>
<td>e. EA model and facilitate the development of a shared cultural understanding and involvement in global issues through the use of contemporary communication and collaboration tools.</td>
<td>3.72</td>
</tr>
</tbody>
</table>

Table 12 displays results about the ISTE-Standards-A five standard means and standard deviation and overall means. The overall mean of 3.88 with a standard deviation of .66 indicated that administrators perceived their knowledge of the ISTE-Standards-A as good. The results of the administrator perceived knowledge ranged from the lowest perceive knowledge on section V) Systematic Improvement ($M = 3.72, SD = .77$) to the highest perceived knowledge on section VI) Digital Citizenship ($M = 4.11, SD = .64$).

Table 12

_ISTE Standards-A Perceived Knowledge Mean and Standard Deviation of Standards_

<table>
<thead>
<tr>
<th>Section/Theme</th>
<th>$M$</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td>II. Visionary Leadership</td>
<td>3.73</td>
<td>.72</td>
</tr>
<tr>
<td>III. Digital Age Learning Culture</td>
<td>3.92</td>
<td>.70</td>
</tr>
<tr>
<td>IV. Excellence in Professional Practice</td>
<td>3.93</td>
<td>.76</td>
</tr>
<tr>
<td>V. Systematic Improvement</td>
<td>3.72</td>
<td>.77</td>
</tr>
<tr>
<td>VI. Digital Citizenship</td>
<td>4.11</td>
<td>.64</td>
</tr>
<tr>
<td><strong>Total (Perceived Knowledge)</strong></td>
<td><strong>3.88</strong></td>
<td><strong>.66</strong></td>
</tr>
</tbody>
</table>
Section VII: VTSIP

Table 13 displays perceived knowledge of the VTSIP that includes mean score results for each of the eight indicators. The overall mean of 4.11 with a standard deviation of .71 indicated that administrators perceived their knowledge of the VTSIP as excellent. The results of the administrator perceived knowledge ranged from the lowest perceive knowledge on item g) implementing technology lessons ($M = 3.78$, $SD = 1.13$) to the highest perceived knowledge on item d) accessing and exchanging information ($M = 4.39$, $SD = .83$).
Table 13

*VTSIP Perceived Knowledge Mean and Standard Deviation of Standards*

<table>
<thead>
<tr>
<th>Item/Indicator</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. EA shall be able to demonstrate effective use of a computer system and utilize computer software.</td>
<td>4.26</td>
<td>.77</td>
</tr>
<tr>
<td>b. EA shall be able to apply knowledge of terms associated with educational computing and technology.</td>
<td>3.98</td>
<td>.83</td>
</tr>
<tr>
<td>c. EA shall be able to apply computer productivity tools for professional use.</td>
<td>4.20</td>
<td>.81</td>
</tr>
<tr>
<td>d. EA shall be able to use electronic technologies to access and exchange information.</td>
<td>4.39</td>
<td>.83</td>
</tr>
<tr>
<td>e. EA shall be able to identify, locate, evaluate, and use appropriate instructional hardware and software to support Virginia's Standards of Learning and other instructional objectives.</td>
<td>3.96</td>
<td>.87</td>
</tr>
<tr>
<td>f. EA shall be able to use educational technologies for data collection, information management, problem solving, decision making, communication, and presentation within the curriculum.</td>
<td>4.07</td>
<td>.85</td>
</tr>
<tr>
<td>g. EA shall be able to plan and implement lessons and strategies that integrate technology to meet the diverse needs of learners in a variety of educational settings.</td>
<td>3.78</td>
<td>1.13</td>
</tr>
<tr>
<td>h. EA shall demonstrate knowledge of ethical and legal issues relating to the use of technology.</td>
<td>4.24</td>
<td>.82</td>
</tr>
</tbody>
</table>

| Total (VTSIP Perceived Knowledge) | 4.11 | .71 |

Administrators had the highest knowledge score on the ISTE Standard-A section six, Digital Citizenship (M = 4.11) and the lowest knowledge score on the ISTE Standard-A section five, Systematic Improvement (M = 3.72). The highest knowledge score on the VTSIP pertained to item d) accessing and exchanging information (M = 4.39) and the lowest score pertained to item g) planning and implementing integrated technology lessons to all learners (M = 3.78). Overall, the administrators perceived their
knowledge of the ISTE Standards-A as good \( (M = 3.88) \) and their knowledge of the VTSIP as excellent \( (M = 4.11) \).

**Research Question 2**

Research question two was how do administrators perceive the importance of the ISTE Standards-A and VTSIP?

Table 14 presents mean score results from sections two through six of the survey about administrators’ perceived importance of each ISTE Standards-A performance indicator and related themes.

**Section II: Visionary Leadership**

Table 14 displays the performance indicators from the Visionary Leadership category and descriptive statistics for each. The overall mean of 4.00 with a standard deviation of .67 indicated that administrators agreed that Visionary Leadership was important in their practice. The results of the administrator perceived importance ranged from the lowest perceive importance on the item d) advocating \( (M = 3.58, SD = .99) \) to the highest perceived importance on item a) inspiring and leading \( (M = 4.24, SD = .80) \).

**Section III: Digital Age Learning Culture**

Table 14 also displays the performance indicators from the Digital Age Learning Culture category and descriptive statistics for each. The overall mean of 4.21 with a standard deviation of .64 indicated that administrators strongly agreed that Digital Age Learning Culture was important in their practice. The results of the administrator perceived importance ranged from the lowest perceived importance on item f) promoting globalization \( (M = 3.83, SD = 1.05) \) to the highest perceived importance on items a)
promoting a rigorous education \( (M = 4.38, SD = .71) \) and d) providing learner centered environments \( (M = 4.38, SD = .74) \).

**Section IV: Excellence in Professional Practice**

Table 14 also displays the performance indicators from the Excellence in Professional Practice theme and descriptive statistics for each. The overall mean of 4.23 with a standard deviation of .66 indicated that administrators strongly agreed that Excellence in Professional Practice was important in their practice. The results of the administrator perceived importance ranged from the lowest perceived importance on items c) participation in learning communities \( (M = 4.09, SD = .90) \) and e) staying abreast research \( (M = 4.09, SD = .89) \) to the highest perceived importance on item b) allocating resources \( (M = 4.38, SD = .61) \).

**Section V: Systematic Improvement**

Table 14 also displays the performance indicators from the Systematic Improvement theme and descriptive statistics for each. The overall mean of 4.08 with a standard deviation of .59 indicated that administrators strongly agreed that Systematic Improvement was important in their practice. The results of the administrator perceived importance ranged from the lowest perceived importance on item e) establishing partnerships \( (M = 3.76, SD = .77) \) to the highest perceived importance on item c) data collections and analysis \( (M = 4.30, SD = .73) \).

**Section VI: Digital Citizenship**

Table 14 also displays the performance indicators from the Digital Citizenship theme and descriptive statistics for each. The overall mean of 4.42 with a standard
deviation of .52 indicated that administrators strongly agreed that Digital Citizenship was important in their practice. The results of the administrator perceived importance ranged from the lowest perceive importance on item e) cultural understanding ($M = 3.98, SD = .93$) to the highest perceived importance on item c) establishing ethical policies ($M = 4.63, SD = .61$).

Table 14

*ISTE Standards-A: Perceived Importance Mean and Standard Deviation*

<table>
<thead>
<tr>
<th>Standard/Performance Indicator</th>
<th>$M$</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>II. Visionary Leadership</strong></td>
<td>4.00</td>
<td>.67</td>
</tr>
<tr>
<td>a. Educational Administrators (EA) inspire and lead development and implementation of a shared vision for comprehensive integration of technology to promote excellence and support transformation throughout the organization.</td>
<td>4.24</td>
<td>.80</td>
</tr>
<tr>
<td>b. EA inspire and facilitate among all stakeholders a shared vision of purposeful change that maximizes use of digital-age resources to meet and exceed learning goals, support effective instructional practice, and maximize performance of district and school leaders.</td>
<td>4.16</td>
<td>.77</td>
</tr>
<tr>
<td>c. EA engage in an ongoing process to develop, implement, and communicate technology-infused strategic plans aligned with a shared vision.</td>
<td>4.02</td>
<td>.80</td>
</tr>
<tr>
<td>d. EA advocate on local, state and national levels for policies, programs, and funding to support implementation of a technology-infused vision and strategic plan.</td>
<td>3.58</td>
<td>.99</td>
</tr>
<tr>
<td><strong>III. Digital Age Learning Culture</strong></td>
<td>4.21</td>
<td>.64</td>
</tr>
<tr>
<td>a. EA create, promote, and sustain a dynamic, digital-age learning culture that provides a rigorous, relevant, and engaging education for all students.</td>
<td>4.38</td>
<td>.71</td>
</tr>
<tr>
<td>b. EA ensure instructional innovation focused on continuous improvement of digital-age learning.</td>
<td>4.30</td>
<td>.70</td>
</tr>
<tr>
<td>c. EA model and promote the frequent and effective use of technology for learning.</td>
<td>4.30</td>
<td>.81</td>
</tr>
<tr>
<td>d. EA provide learner-centered environments equipped with technology and learning resources to meet the</td>
<td>4.38</td>
<td>.74</td>
</tr>
</tbody>
</table>
Table 14 (continued)

individual, diverse needs of all learners.

   e.  EA ensure effective practice in the study of technology and its infusion across the curriculum.  4.04  .81

   f.  EA promote and participate in local, national, and global learning communities that stimulate innovation, creativity, and digital age collaboration.  3.83  1.05

IV. Excellence in Professional Practice  4.23  .66

   a.  EA promote an environment of professional learning and innovation that empowers educators to enhance student learning through the infusion of contemporary technologies and digital resources.  4.35  .74

   b.  EA allocate time, resources, and access to ensure ongoing professional growth in technology fluency and integration.  4.38  .61

   c.  EA facilitate and participate in learning communities that stimulate, nurture and support administrators, faculty, and staff in the study and use of technology.  4.09  .90

   d.  EA promote and model effective communication and collaboration among stakeholders using digital age tools.  4.29  .82

   e.  EA stay abreast of educational research and emerging trends regarding effective use of technology and encourage evaluation of new technologies for their potential to improve student learning.  4.09  .89

V. Systematic Improvement  4.08  .59

   a.  EA provide digital age leadership and management to continuously improve the organization through the effective use of information and technology resources.  4.13  .75

   b.  EA lead purposeful change to maximize the achievement of learning goals through the appropriate use of technology and media-rich resources.  4.11  .85

   c.  EA collaborate to establish metrics, collect and analyze data, interpret results, and share findings to improve staff performance and student learning.  4.30  .73

   d.  EA recruit and retain highly competent personnel who use technology creatively and proficiently to advance academic and operational goals.  4.29  .73

   e.  EA establish and leverage strategic partnerships to  3.76  .77
Table 14 (continued)

f. EA establish and maintain a robust infrastructure for technology including integrated, interoperable technology systems to support management, operations, teaching, and learning.

3.89  .74

VI. Digital Citizenship

4.42  .52

a. EA model and facilitate understanding of social, ethical and legal issues and responsibilities related to an evolving digital culture.

4.37  .71

b. EA ensure equitable access to appropriate digital tools and resources to meet the needs of all learners.

4.50  .66

c. EA promote, model and establish policies for safe, legal, and ethical use of digital information and technology.

4.63  .61

d. EA promote and model responsible social interactions related to the use of technology and information.

4.61  .58

e. EA model and facilitate the development of a shared cultural understanding and involvement in global issues through the use of contemporary communication and collaboration tools.

3.98  .93

Table 15 displays results about the ISTE-Standards-A from sections two through six of the survey. Perceived importance of the ISTE-Standards-A includes mean score and standard deviation results for each of the five themes. The overall mean of 4.18 with a standard deviation of .55 indicated that administrators strongly agreed that the ISTE Standards-A are important in their practice. The results of the administrator perceived importance ranged from the lowest perceive importance on section two, Visionary Leadership ($M = 4.00, SD = .67$) to the highest perceived importance on section six, Digital Citizenship ($M = 4.42, SD = .52$).
Table 15

*ISTE Standards-A Perceived Importance Mean and Standard Deviation*

<table>
<thead>
<tr>
<th>Section/Theme</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>II. Visionary Leadership</td>
<td>4.00</td>
<td>.67</td>
</tr>
<tr>
<td>III. Digital Age Learning Culture</td>
<td>4.21</td>
<td>.64</td>
</tr>
<tr>
<td>IV. Excellence in Professional Practice</td>
<td>4.23</td>
<td>.66</td>
</tr>
<tr>
<td>V. Systematic Improvement</td>
<td>4.08</td>
<td>.59</td>
</tr>
<tr>
<td>VI. Digital Citizenship</td>
<td>4.42</td>
<td>.52</td>
</tr>
<tr>
<td><strong>Total (Perceived Importance)</strong></td>
<td><strong>4.18</strong></td>
<td><strong>.55</strong></td>
</tr>
</tbody>
</table>

**Section VII: VTSIP**

Table 16 presents results about the perceived importance of the VTSIP that includes mean score and standard deviation results for each of the eight indicators as well as an overall score. The overall mean of 4.35 with a standard deviation of .64 indicated that administrators strongly agreed that that the VTSIP are important in their practice.

The results of the administrator perceived importance ranged from the lowest perceive importance on item g) planning technology lessons \((M = 4.04, SD = 1.17)\) to the highest perceived importance on item d) accessing and exchanging information \((M = 4.65, SD = .57)\).
Table 16

*VTSIP Perceived Importance Mean and Standard Deviation*

<table>
<thead>
<tr>
<th>Item/Indicator</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. EA shall be able to demonstrate effective use of a computer system and utilize computer software.</td>
<td>4.48</td>
<td>.69</td>
</tr>
<tr>
<td>b. EA shall be able to apply knowledge of terms associated with educational computing and technology.</td>
<td>4.17</td>
<td>.74</td>
</tr>
<tr>
<td>c. EA shall be able to apply computer productivity tools for professional use.</td>
<td>4.35</td>
<td>.77</td>
</tr>
<tr>
<td>d. EA shall be able to use electronic technologies to access and exchange information.</td>
<td>4.65</td>
<td>.57</td>
</tr>
<tr>
<td>e. EA shall be able to identify, locate, evaluate, and use appropriate instructional hardware and software to support Virginia's Standards of Learning and other instructional objectives.</td>
<td>4.20</td>
<td>.98</td>
</tr>
<tr>
<td>f. EA shall be able to use educational technologies for data collection, information management, problem solving, decision making, communication, and presentation within the curriculum.</td>
<td>4.33</td>
<td>.76</td>
</tr>
<tr>
<td>g. EA shall be able to plan and implement lessons and strategies that integrate technology to meet the diverse needs of learners in a variety of educational settings.</td>
<td>4.04</td>
<td>1.17</td>
</tr>
<tr>
<td>h. EA shall demonstrate knowledge of ethical and legal issues relating to the use of technology.</td>
<td>4.54</td>
<td>.66</td>
</tr>
<tr>
<td><strong>Total (VTSIP Perceived Importance)</strong></td>
<td>4.35</td>
<td>.64</td>
</tr>
</tbody>
</table>

Administrators had the highest perceived importance score on the ISTE Standard-A section six, Digital Citizenship category (M = 4.42), and the lowest perceived importance score on section two, Visionary Leadership category (M = 4.00). The highest perceived importance score on the VTSIP pertained to item d) accessing and exchanging information (M = 4.65), and the lowest perceived importance score on item g) planning and implementing integrated technology lessons to all learners (M = 4.04). Overall the
administrators strongly agreed that the ISTE Standards-A and the VTSIP were important in their practice.

**Research Question 3**

Research question three was what are administrators’ perceptions of the ISTE Standards-A and VTSIP?

Table 17 presents results about the perception of the ISTE Standards-A. Perception was calculated by averaging the perceived knowledge and perceived importance scores. The overall perception of the ISTE Standards-A was excellent. \( M = 4.03, SD = .50 \).

<table>
<thead>
<tr>
<th>Item</th>
<th>( M )</th>
<th>( SD )</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISTE Standards-A Perceived Knowledge</td>
<td>3.88</td>
<td>.66</td>
</tr>
<tr>
<td>ISTE Standards-A Perceived Importance</td>
<td>4.18</td>
<td>.55</td>
</tr>
<tr>
<td>Total (Perceived Perception)</td>
<td>4.03</td>
<td>.50</td>
</tr>
</tbody>
</table>

Table 18 presents results about the VTSIP perception. Perception was calculated by averaging the perceived knowledge and perceived importance scores. The perception of the VTSIP was also excellent \( M = 4.23, SD = .60 \).
Table 18

*VTSIP Perceived Perception Mean and Standard Deviation*

<table>
<thead>
<tr>
<th>Item</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>VTSIP Perceived Knowledge</td>
<td>4.11</td>
<td>.71</td>
</tr>
<tr>
<td>VTSIP Perceived Importance</td>
<td>4.35</td>
<td>.64</td>
</tr>
<tr>
<td>Total (Perceived Perception)</td>
<td>4.23</td>
<td>.60</td>
</tr>
</tbody>
</table>

Administrators had a higher perceived knowledge and importance score on the VTSIP and a lower perceived knowledge and importance score on the ISTE Standards-A. Administrators had a higher perception score on the VTSIP and a lower perception score on the ISTE Standards-A. Overall, the administrators’ perceptions of the ISTE Standards-A and the VTSIP were excellent.

**Research Question 4**

Research question four was is there a statistically significant difference in administrators’ perceptions of the ISTE Standards-A and administrators’ perceptions of the VTSIP?

Table 19 shows the results of the paired samples t-test which was calculated for administrators’ perceptions of the ISTE Standards-A and administrators’ perceptions of the VTSIP. The t-test revealed that there was a statistically significant difference at the .05 alpha level in administrators’ perceptions of the ISTE Standards-A and administrators’ perceptions of the VTSIP, $t(42) = -3.17, p = .003$. The mean total perception score of the VTSIP ($M = 4.25, SD = .61$) was significantly greater than the mean total perception score of the ISTE Standards-A ($M = 4.04, SD = .51$). It seems that
the participants perception of the VTSIP was higher than their perception of the ISTE Standards-A. These results also indicated that a significant correlation exists between the two variables \((r = .699, p < .001)\) indicating that administrators who had a high perception score on the ISTE Standards-A tended to have a high perception score on the VTSIP.

Table 19

Paired Samples t-Test Statistics by ISTE Standards-A and VTSIP Total Perception Scores

<table>
<thead>
<tr>
<th>Scores</th>
<th>M</th>
<th>N</th>
<th>SD</th>
<th>SE</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Perception Score</td>
<td>4.04</td>
<td>43</td>
<td>.51</td>
<td>.08</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ISTE Standards-A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Perception Score</td>
<td>4.25</td>
<td>43</td>
<td>.61</td>
<td>.09</td>
<td>-3.17</td>
<td>42</td>
<td>.003</td>
</tr>
<tr>
<td>(VTSIP)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Research Question 5

Research question five was is there a statistically significant difference between the administrators’ perceptions of the ISTE Standards-A and by select demographic variables: (a) age, (b) current administrator title, (c) current level of administration (elementary/middle/high), (d) gender, (e) ethnicity, (f) highest degree completion, (g) years in administration, and (h) region?

Table 20 presents the results of a one-way ANOVA which was calculated for the administrator’s perception of the ISTE Standards-A based on the administrators’ age. There was no statistically significant difference at the .05 alpha level in administrator’s perception of the ISTE Standards-A by age, \(F(4, 38) = 2.46, p = .06\).
Table 20

ANOVA Summary Table within ISTE Standards-A Perception Based on Age

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Participants</td>
<td>2.22</td>
<td>4</td>
<td>.55</td>
<td>2.46</td>
<td>.06</td>
</tr>
<tr>
<td>Within Participants</td>
<td>8.58</td>
<td>38</td>
<td>.23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10.80</td>
<td>42</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 21 displays the results of a one-way ANOVA which was calculated for the administrator’s perception of the ISTE Standards-A based on the administrators’ current title. There was no statistically significant difference at the .05 alpha level in administrator’s perception of the ISTE Standards-A by current title, $F(3, 39) = .20, p = .90$.

Table 21

ANOVA Summary Table within ISTE Standards-A Perception Based on Current Title

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Participants</td>
<td>.16</td>
<td>3</td>
<td>.05</td>
<td>.20</td>
<td>.90</td>
</tr>
<tr>
<td>Within Participants</td>
<td>10.64</td>
<td>39</td>
<td>.27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10.80</td>
<td>42</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 22 displays the results of a one-way ANOVA which was calculated for the administrator’s perception of the ISTE Standards-A based on the administrators’ level of administration. There was no statistically significant difference at the .05 alpha level in administrator’s perception of the ISTE Standards-A by level of administration, $F(3, 39) = .59, p = .62$. 

80
Table 22

ANOVA Summary Table within ISTE Standards-A Perception Based on Level of Administration

<table>
<thead>
<tr>
<th>Level</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Participants</td>
<td>.47</td>
<td>3</td>
<td>.16</td>
<td>.59</td>
<td>.62</td>
</tr>
<tr>
<td>Within Participants</td>
<td>10.53</td>
<td>39</td>
<td>.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10.80</td>
<td>42</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 23 displays the results of the independent samples *t*-test which was calculated for administrators’ perceptions of the ISTE Standards-A based on gender. The results of the Levene’s test for equality of variance showed that the variance of the two groups were not significantly different (*F* = .634, *p* > .05). As a result, the result of the independent samples *t*-test for equal variances is reported. The independent samples *t*-test revealed that there was no statistically significant difference at the .05 alpha level in administrators’ perceptions of the ISTE Standards-A by gender, *t*(41) = -1.69, *p* = .10. Although female perception scores (*M* = 4.15, *SD* = .47) were higher than male scores (*M* = 3.89, *SD* = .53), there was no significant difference. Therefore, there appears to be no difference between female and male perceived perception of the ISTE Standards-A. Furthermore, the means of both groups show that they are competent in their perceptions of the ISTE Standards-A.
Table 23

*Independent Samples t-Test Perceived Perception of the ISTE Standards-A by Gender*

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perception</td>
<td>Male</td>
<td>19</td>
<td>3.89</td>
<td>.53</td>
<td>-1.69</td>
</tr>
<tr>
<td>Scores</td>
<td>Female</td>
<td>24</td>
<td>4.15</td>
<td>.47</td>
<td></td>
</tr>
</tbody>
</table>

*Two-tailed p value

Table 24 displays the results of a one-way ANOVA which was calculated for the administrator’s perception of the ISTE Standards-A based on the administrators’ ethnicity. There was no statistically significant difference at the .05 alpha level in administrator’s perception of the ISTE Standards-A by ethnicity, $F(2, 40) = .30, p = .74$.

Table 24

*ANOVA Summary Table within ISTE Standards-A Perception Based on Ethnicity*

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between</td>
<td>.16</td>
<td>2</td>
<td>.08</td>
<td>.30</td>
<td>.74</td>
</tr>
<tr>
<td>Within</td>
<td>10.64</td>
<td>40</td>
<td>.27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10.80</td>
<td>42</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 25 displays the results of a one-way ANOVA which was calculated for the administrator’s perception of the ISTE Standards-A based on the administrators’ highest completed degree. There was no statistically significant difference at the .05 alpha level in administrator’s perception of the ISTE Standards-A by highest completed degree, $F(4, 38) = 1.1, p = .37$. 

82
Table 25

ANOVA Summary Table within ISTE Standards-A Perception Based on Highest Completed Degree

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Participants</td>
<td>1.12</td>
<td>4</td>
<td>.28</td>
<td>1.10</td>
<td>.37</td>
</tr>
<tr>
<td>Within Participants</td>
<td>9.68</td>
<td>38</td>
<td>.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10.80</td>
<td>42</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 26 displays the results of a one-way ANOVA which was calculated for the administrator’s perception of the ISTE Standards-A based on the administrators’ years in administration. There was no statistically significant difference at the .05 alpha level in administrator’s perception of the ISTE Standards-A by years in administration, $F(3, 39) = .87, p = .47$.

Table 26

ANOVA Summary Table within ISTE Standards-A Perception Based on Years in Administration

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years in Adm.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Participants</td>
<td>.68</td>
<td>3</td>
<td>.22</td>
<td>.87</td>
<td>.47</td>
</tr>
<tr>
<td>Within Participants</td>
<td>10.12</td>
<td>39</td>
<td>.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10.80</td>
<td>42</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 27 displays the results of a one-way ANOVA which was calculated for the administrator’s perception of the ISTE Standards-A based on the administrators’ region of employment. There was no statistically significant difference at the .05 alpha level in administrator’s perception of the ISTE Standards-A by region, $F(7, 35) = .72, p = .65$. 

83
Table 27

ANOVA Summary Table within ISTE Standards-A Perception Based on Region of Employment

<table>
<thead>
<tr>
<th>Region</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Participants</td>
<td>1.37</td>
<td>7</td>
<td>.19</td>
<td>.72</td>
<td>.65</td>
</tr>
<tr>
<td>Within Participants</td>
<td>9.43</td>
<td>35</td>
<td>.27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10.80</td>
<td>42</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall, age has the lowest significant value, and current title had the highest significant value. However, there were no statistically significant differences between administrators’ perceptions of the ISTE Standards-A and the eight demographic variables.

Research Question 6

Research question six was is there a statistically significant difference between administrators’ perceptions of the VTSIP and by select demographic variables: (a) age, (b) current administrator title, (c) current level of administration (elementary/middle/high), (d) gender, (e) ethnicity, (f) highest degree completion, (g) years in administration and (h) region?

Table 28 displays the results of a one-way ANOVA which was calculated for the administrator’s perception of the ISTE Standards-A based on the administrators’ age. There was no statistically significant difference at the .05 alpha level in administrator’s perception of the ISTE Standards-A by age, \( F(4, 38) = 2.52, p = .06. \)
Table 28

ANOVA Summary Table within VTSIP Perception Based on Age

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Participants</td>
<td>3.25</td>
<td>4</td>
<td>.81</td>
<td>2.52</td>
<td>.06</td>
</tr>
<tr>
<td>Within Participants</td>
<td>12.27</td>
<td>38</td>
<td>.32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15.52</td>
<td>42</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 29 displays the results of a one-way ANOVA which was calculated for the administrator’s perception of the ISTE Standards-A based on the administrators’ current title. There was no statistically significant difference at the .05 alpha level in administrator’s perception of the ISTE Standards-A by current title, $F(3, 39) = .52, p = .67$.

Table 29

ANOVA Summary Table within VTSIP Perception Based on Current Title

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Participants</td>
<td>.59</td>
<td>3</td>
<td>.20</td>
<td>0.52</td>
<td>.67</td>
</tr>
<tr>
<td>Within Participants</td>
<td>14.93</td>
<td>39</td>
<td>.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15.52</td>
<td>42</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 30 displays the results of a one-way ANOVA which was calculated for the administrator’s perception of the ISTE Standards-A based on the administrators’ level of administration. There was no statistically significant difference at the .05 alpha level in administrator’s perception of the ISTE Standards-A by level of administration, $F(3, 39) = .790, p = .51$. 

85
Table 30

ANOVA Summary Table within VTSIP Perception Based on Level of Administration

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between</td>
<td>0.89</td>
<td>3</td>
<td>.30</td>
<td>.790</td>
<td>.51</td>
</tr>
<tr>
<td>Participants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td>14.63</td>
<td>39</td>
<td>.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15.52</td>
<td>42</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 31 displays the results of the independent samples t-test which was calculated for administrators’ perceptions of the VTSIP based on gender. The results of the Levene’s test for equality of variance showed that the variance of the two groups were not significantly different ($F = 1.03, p > .05$). As a result, the result of the independent samples t-test for equal variances is reported. The independent samples t-test revealed that there was a statistically significant difference at the .05 alpha level in administrators’ perceptions of the VTSIP by gender, $t(41) = -2.02, p = .05$. Female perception scores ($M = 4.41, SD = .54$) were higher than male scores ($M = 4.05, SD = .54$), and there was a significant difference. Therefore, there appears to be a difference between female and male perceived perception of the VTSIP. Nevertheless, the means of both groups show their perceptions of the ISTE Standards-A as excellent.

Table 31

Independent Samples t-Test Perceived Perception of the VTSIP by Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perception</td>
<td>Male</td>
<td>19</td>
<td>4.05</td>
<td>.64</td>
<td>-2.02</td>
</tr>
<tr>
<td>Scores</td>
<td>Female</td>
<td>24</td>
<td>4.41</td>
<td>.54</td>
<td></td>
</tr>
</tbody>
</table>

*Two-tailed p value
Table 32 displays the results of a one-way ANOVA which was calculated for the administrator’s perception of the ISTE Standards-A based on the administrators’ ethnicity. There was no statistically significant difference at the .05 alpha level in administrator’s perception of the ISTE Standards-A by ethnicity, $F(2, 40) = 1.64, p = .21$.

Table 32

ANOVA Summary Table within VTSIP Perception Based on Ethnicity

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Participants</td>
<td>1.17</td>
<td>2</td>
<td>.59</td>
<td>1.64</td>
<td>.21</td>
</tr>
<tr>
<td>Within Participants</td>
<td>14.35</td>
<td>40</td>
<td>.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15.52</td>
<td>42</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 33 displays the results of a one-way ANOVA which was calculated for the administrator’s perception of the ISTE Standards-A based on the administrators’ highest completed degree. There was no statistically significant difference at the .05 alpha level in administrator’s perception of the ISTE Standards-A by highest completed degree, $F(4, 38) = .51, p = .73$.

Table 33

ANOVA Summary Table within VTSIP Perception Based on Highest Completed Degree

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Participants</td>
<td>.78</td>
<td>4</td>
<td>.20</td>
<td>.51</td>
<td>.73</td>
</tr>
<tr>
<td>Within Participants</td>
<td>14.74</td>
<td>38</td>
<td>.39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15.52</td>
<td>42</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 34 displays the results of a one-way ANOVA which was calculated for the administrator’s perception of the ISTE Standards-A based on the administrators’ years in
administration. There was no statistically significant difference at the .05 alpha level in administrator’s perception of the ISTE Standards-A by years in administration, $F(3, 39) = 1.88, p = .15$.

Table 34

ANOVA Summary Table within VTSIP Perception Based on Years in Administration

<table>
<thead>
<tr>
<th></th>
<th>$SS$</th>
<th>$df$</th>
<th>$MS$</th>
<th>$F$</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years in Adm.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Participants</td>
<td>1.96</td>
<td>3</td>
<td>.65</td>
<td>1.88</td>
<td>.15</td>
</tr>
<tr>
<td>Within Participants</td>
<td>13.56</td>
<td>39</td>
<td>.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15.52</td>
<td>42</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 35 displays the results of a one-way ANOVA which was calculated for the administrator’s perception of the ISTE Standards-A based on the administrators’ region of employment. There was no statistically significant difference at the .05 alpha level in administrator’s perception of the ISTE Standards-A by years in administration, $F(7, 35) = .63, p = .73$.

Table 35

ANOVA Summary Table within VTSIP Perception Based on Region of Employment

<table>
<thead>
<tr>
<th></th>
<th>$SS$</th>
<th>$df$</th>
<th>$MS$</th>
<th>$F$</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Participants</td>
<td>1.73</td>
<td>7</td>
<td>.25</td>
<td>.63</td>
<td>.73</td>
</tr>
<tr>
<td>Within Participants</td>
<td>13.79</td>
<td>35</td>
<td>.39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15.52</td>
<td>42</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall, age had the lowest significant value and highest completed degree had the highest significant value. Additionally, there were no statistically significant differences between administrators’ perceptions of the VTSIP and seven of the
demographic variables. However, there was a statically significant difference in the male and female perceptions of the VTSIP.

Summary of Research Findings

Six research questions were examined in this research study to determine the knowledge, importance and perceptions of the ISTE Standards-A and VTSIP in Virginia and the demographic variables that might affect the perceptions. Based on the research findings and the significance of all statistical tests being at the .05 alpha level, administrators perceived their knowledge of the ISTE Standards-A as a 3.88, good, and their knowledge of the VTSIP as 4.11, excellent. Administrators strongly agreed that both the ISTE Standards-A and the VTSIP were important in their practice; the means were 4.18 and 4.35, respectively. Additionally, their perceptions of both the ISTE Standards-A and the VTSIP were excellent with mean scores of 4.03 and 4.23, respectively.

There were no statistically significant differences found between the perception of the standards and by the selected demographic variables. However, there was a statistically significant difference found between male and female perceptions of the VTSIP, \( t(41) = -2.02, p = .05 \). Additionally, there was a statistically significant difference found between males and females on their perceptions of the ISTE Standards-A and perceptions of the VTSIP, \( t(42) = -3.17, p = .003 \).
CHAPTER V
CONCLUSION

Technology has become inescapable in educational systems, and knowledge of technology has become an essential administrative prerequisite (Chang et al., 2008). Ogle (2002) shows that second to teachers, administrators are the next most important factor that affects student performance. Although their knowledge of technology is influential to student success (McCampbell, 2001), their role as leader is the most important factor affecting technology integration (Afshari et al., 2009). With the dramatic advances in technologies, the need increasingly arises for school administrators to understand the impact of technology and respond to technological changes as technology leaders within their schools (Richardson et al., 2012). Chang et al. (2008) noted that technology leadership involves applying the leadership skills necessary to implement technology and prepare schools for the 21st Century. Richardson et al. (2012) emphasized to be 21st Century leaders in technology-infused schools, knowledge and use of standards cannot be ignored. For technology and as a best practice, administrators must provide technology leadership that requires awareness and perception of practice of the national and state technology standards.

Therefore, the purpose of the study was to determine administrators’ self-assessed perceived knowledge, importance, and perceptions of the ISTE Standards-A and the VTSIP. This chapter summarizes the study, overviews the research methodology and
findings, notes other comments and concerns of the standards, and presents discussions, conclusions, implications, and recommendations for future studies.

**Research Methodology and Findings**

The dependent variables used in the study were (a) administrators’ perceived knowledge and importance of the ISTE Standards-A and the VTSIP and (b) administrators’ perceptions of the ISTE Standards-A and the VTSIP. The problem of the study was to investigate public school administrators’ perceived knowledge, importance and perceptions of the national and state technology standards as technology leaders within their schools.

A survey based on the ISTE Standards-A and the VTSIP was developed by the researcher and used to collect data. The responses were analyzed using IBM SPSS software. Descriptive statistics, ANOVA and t-tests were used to analyze the data. The research designs used in the study were descriptive and causal comparative. Participants in the study completed a survey instrument that was divided into eight sections. Sections two through six of the survey collected data about administrators’ perceived knowledge, importance and perceptions of the ISTE Standards-A. Section seven of the survey collected data about administrators’ perceived knowledge, importance and perceptions of the VTSIP. Section eight of the survey collected data about general and specific demographic questions and statements. Forty-three administrators completed and returned the survey instrument used in the study.

The mean interpretation table (Table 2) was used to interpret and summarize the findings of the study.
Research question one was “how do administrators perceive their knowledge of the ISTE Standards-A and VTSIP?” Based on a mean score of 3.88, administrators perceived their knowledge of the ISTE Standards-A as good. Administrators’ lowest perceive knowledge score was on Systematic Improvement (M = 3.72) and their highest perceived knowledge score was on Digital Citizenship (M = 4.11). Based on a mean score of 4.11, administrators perceived their knowledge of the VTSIP as excellent. The lowest perceive knowledge of the administrators was on implementing technology lessons (M = 3.78) and their highest perceived knowledge was on accessing and exchanging information (M = 4.39). The low score on implementing technology lessons may be because administrators typically do not implement lessons but evaluate lessons that are implemented by others. The high score may be attributed to the rate at which administrators have to access and exchange information in their day to day job procedures. Additionally, they feel accessing and exchanging information is a basic skill that they are at ease doing.

Research question two was “how do administrators perceive the importance of the ISTE Standards-A and VTSIP?” Based on a mean score of 4.18, administrators strongly agreed that the ISTE Standards-A were important in their practice. Administrators’ lowest perceive importance score was on Visionary Leadership (M = 4.00) and their highest perceived importance score was on Digital Citizenship (M = 4.42). Based on a mean score of 4.35, administrators also strongly agreed that the VTSIP were important in their practice. The lowest perceived importance of the administrators was on planning and implementing integrated technology lessons to all learners (M = 4.04). Administrators may not see the importance of planning technology lessons because they
do not have to do that as part of their jobs which may help to explain the low score. Administrators’ highest perceived importance was on accessing and exchanging information (\(M = 4.65\)). Administrators’ daily job consists of exchanging and accessing information which may explain the high score on that standard. Furthermore, administrators are comfortable using technology to exchange and access information.

Research question three was “what are administrators’ perceptions of the ISTE Standards-A and VTSIP?” Based on a mean score of 4.03, administrators’ perceptions of the ISTE Standards-A were excellent. Based on a mean score of 4.23, their perceptions of the VTSIP was also excellent. Administrators had a higher mean perception of the VTSIP. Administrators may feel more obligated to know what the state requires of them versus what is required of them nationally which may address the higher scores on the VTSIP.

Research question four was “is there a statistically significant difference in administrators’ perceptions of the ISTE Standards-A and administrators’ perceptions of the VTSIP?” The results of a t-test showed that there was a statistically significant difference at the .05 alpha level in administrators’ perceptions of the ISTE Standards-A and administrators’ perceptions of the VTSIP, \(t(42) = -3.17, p = .003\). These results also indicated that a significant correlation exists between the two variables (\(r = .699, p < .001\)) indicating that administrators who had a high perception score on the ISTE Standards-A tended to have a high perception score on the VTSIP.

Research question five was “is there a statistically significant difference between the administrators’ perceptions of the ISTE Standards-A and by select demographic variables: (a) age, (b) current administrator title, (c) current level of administration
(elementary/middle/high), (d) gender, (e) ethnicity, (f) highest degree completion, (g) years in administration and (h) region?” The results of the ANOVA and t-tests showed that there were no statistically significant differences between administrators’ perceptions of the ISTE Standards-A and the eight demographic variables used in the study. One possibility of not finding a statistically significant difference between administrators’ perceptions of the ISTE Standards-A and the demographic variables may be because the population of the study could have been too small. A larger population needs to be further studied to see if a statistically significant difference exists between administrators’ perceptions of the ISTE Standards-A and the demographic variables.

Research question six was “is there a statistically significant difference between administrators’ perceptions of the VTSIP and by select demographic variables: (a) age, (b) current administrator title, (c) current level of administration (elementary/middle/high), (d) gender, (e) ethnicity, (f) highest degree completion, (g) years in administration and (h) region?” The results of a t-test showed that there was a statistically significant difference at the .05 alpha level in male and female perceptions of the VTSIP ($t(41) = -2.02$, $p = .05$). Female perception scores ($M = 4.41$) were higher than male perception scores ($M = 4.05$). The results of the ANOVA showed that there were no statistically significant differences between administrators’ perceptions of the VTSIP and by the other seven demographic variables. One possibility of not finding a statistically significant difference between administrators’ perceptions of the VTSIP and by seven of the eight demographic variables may be because the population of the study could have been too small. A larger population needs to be further studied to see if a
statistically significant difference exists between administrators’ perceptions of the VTSIP and the demographic variables.

**Other Comments and Concerns of ISTE Standards-A and VTSIP**

The administrators were asked in section six, statement f to add any questions, comments, or concerns that they have about the ISTE-Standards A. One participant wrote that lack of access hinders progress. Another participant noted that technology issues were addressed at the district level, not the school level. A different participant commented that although administrators are knowledgeable of the standards, they need more resources to help them encourage and implement each standard. A final participant was concerned with the limited amount of resources and training for students and teachers due to funding.

Additionally, the administrators were asked in section seven, statement i to add any questions, comments, or concerns that they have about the VTSIP. One participant noted that the VTSIP was concerned with more “direct and essential” skills. The participant continued to note that there were less Virginia standards and the standards were clearer and easier to understand. Another participant commented that administrators need to be more involved in technology implementation in the district and schools. A third participant stated that the ability to share and be creative with technology is limited by “time, location, and access.” A final participant wrote that they were uncomfortable with the statement about lesson plans as they do not plan lessons.
Discussions

The results of the study indicated how administrators perceived their knowledge of the ISTE Standards-A. They perceived their knowledge of the VTSIP as excellent and their perception of the ISTE Standards-A and VTSIP as excellent. They also strongly agreed that the ISTE Standards-A and the VTSIP were important in their practice.

Systematic Improvement received the lowest knowledge mean score while Visionary Leadership received the lowest importance mean score. Nevertheless, Digital Citizenship received the highest knowledge mean score and highest knowledge importance score. Cummings (2012) designed her survey based on the ISTE NETS-A and performance indicators. After administering her survey, she found that administrators rated themselves on proficiency of the NETS-A scoring the highest on Leadership and Vision and the least on Assessment and Evaluation. She also found that administrators rated themselves on importance of the NETS-A scoring the highest on Leadership and Vision and the least on Social, Legal and Ethical Issues. Cummings’ (2012) findings and the findings of this study showed different results, especially in the Visionary category; she revealed high scores and this study revealed low scores. However, Duncan (2011) found that administrators failed to meet the Leadership and Vision and Assessment and Evaluation standards while Productivity and Professional Practice was met with the highest mean score. Curnyn (2013) found that administrators rated themselves the highest on Productivity and Professional Practice and the least on Leadership and Vision. Both of their findings of Leadership and Vision are consistent with the findings of this study.

The results of the study indicated that the lowest average knowledge score and the lowest average importance score were on the same statement. Planning and implementing
technology lessons received the lowest mean scores on knowledge and importance of the VTSIP ($M = 3.78, M = 4.04$; respectively). One administrator that participated in the study commented that they do not plan lessons so rating the standard on planning and implementing technology lessons received the lower rating, which is understandable. Additionally, the highest average knowledge score and the highest average importance score were on the same statement. Accessing and exchanging information received the highest mean scores on knowledge and importance of the VTSIP ($M = 4.39, M = 4.65$; respectively). According to Culotta, Bekkerman and McCallum (2004), email, which involves accessing and exchanging information, is the most used online activity; this could explain the high ratings because its use is so widespread.

The results of the study indicated that administrators had a significantly higher perception score of the VTSIP. This may be because to get a Virginia Educator License, one has to show proficiency in the VTSIP, making them more familiar to them. On the other hand, there is no proficiency of the ISTE Standards-A required for licensure.

The results of the study also indicated no statistically significant differences between administrators’ perceptions of the ISTE Standards-A and by the eight selected demographic variables. Duncan (2011) studied administrators’ technology leadership and engagement by administering the Principals Technology Leadership Assessment (PTLA); his findings on gender and years as an educator support the findings of this study. However, Brunson (2015) studied the effect of years of experience on technology leadership competence. She found that administrators’ years of experience affect leadership competence; this was contradictory to the findings of this study. Duncan (2011) found contradicting results too when he studied school level. He found a
significant difference found between the PTLA and school level. Many times, age comes into the discussion when talking about technology. It is hypothesized that veteran administrators are not as comfortable with technology as novice administrators are. The results of the study contradicted that assumption and found no difference in age and perceptions of the standards.

The results of the study indicated a statistically significant difference in the male and female perceptions of the VTSIP. Consistent with the findings of this study, in 2011, Bangolu administered the PTLA, which is an assessment aligned with the NETS-A. His results revealed that technology leadership competence varied based on gender.

The results of the study showed that age received the lowest significant $p$ value in both research questions five and six which were about relationships between demographics and the national and state technology standards ($p = .06$ for both). However, for the ISTE Standards-A, title received the highest significant $p$ value ($p = .90$); and for the VTSIP, level of degree completion received the highest significant $p$ value ($p = .73$).

The study found no statistically significant differences between administrators’ perceptions of the VTSIP and by the other seven demographic variables of this study.

**Conclusions**

As technologies become pervasive in educational systems, expertise in technology is becoming an essential administrative prerequisite (Chang et al., 2008). With the dramatic advances in technologies, the need is increasingly arising for school administrators to understand the impact of technology and respond to technological changes (Richardson et al., 2012). This need along with the other duties of an
administrator is causing challenges in administrative leadership (Connelly, 2008; Hilliard & Jackson, 2011). This administrative leadership requires technology leadership (Iudica, 2011). Research shows that strong technology leadership can lead to success with technology within schools (Anderson & Dexter, 2005).

Chang et al. (2008) noted that technology leadership involved applying the leadership skills necessary to implement technology and prepare schools for the 21st Century. Additionally, providing technology leadership required administrators to be aware of their perception and practice of their national and state technology standards (Demory, 2011). Furthermore, the ISTE (2011b) commanded that technology leadership within schools require administrators to accept new challenges and opportunities.

Administrators, as leaders of their schools in this technological age, must be willing to improve their technology leadership and knowledge of technology standards. Mastery of technology standards for administrators is linked with positive school success and increased student achievement. Without competency in national and state technology standards and an appropriate foundation in technology knowledge and skills, misinformed technology judgments might be made by administrators (Garcia & Abrego, 2014). When administrators incorporate the components of the ISTE Standards-A and VTSIP in their administration as technology leaders, they will foster schools that are successful (e-lead, n.d.). This study was designed to provide quantitative data on administrators’ perceived knowledge, importance and perceptions of practicing the ISTE Standards-A and the VTSIP. The purpose of the study was to determine administrators’ self-assessed perceived knowledge, importance, and perceptions of the ISTE Standards-A and the VTSIP.
An online survey was created (Appendix A). It contained eight sections; section one was a welcome and explanation, sections two through six were based on the ISTE Standards-A, section seven was based on the VTSIP and section eight was based on demographics. The conclusions of the research are as follows:

1. Administrators perceived their knowledge of the ISTE Standards-A as good, and their knowledge of the VTSIP as excellent.
2. Administrators strongly agreed that both the ISTE Standards-A and the VTSIP were important in their practice.
3. The administrator perceptions of both the ISTE Standards-A and the VTSIP were excellent.
4. There was a statistically significant difference found between the perceptions of the ISTE Standards-A and perceptions of the VTSIP.
5. There were no statistically significant differences found between the ISTE Standards-A and by the eight demographic variables.
6. There was a statistically significant difference found between male and female perceptions of the VTSIP. However, there were no other significant differences found between the VTSIP and by the other seven demographic variables.

**Implications**

Administrators hold the key to a high-quality education (Stewart, 2013). Since public education’s adoption of the mandate, *No Child Left Behind*, accountability in education is a focus of many school administrators (Hilliard & Jackson, 2011; Williams & Szal, 2011). This mandate along with the other duties of an administrator is causing
challenges in administrative leadership (Connelly, 2008; Hilliard & Jackson, 2011).

Louis and Robinson (2012) defined administrative leadership as “leadership work that is
focused on the improvement of teaching and learning” (p. 634). Research showed only
strong technology leadership can lead to success with technology within schools
(Anderson & Dexter, 2005). As a result, administrative leadership requires technology
leadership (Iudica, 2011), accordingly, administrators have to be technology leaders of
their schools (Richardson & McLeod, 2011).

The findings of the study show data that may answer questions about
administrators and technology leadership and standards. In the review of literature, there
is no information found on the VTSIP. The results of this study may impact future
researchers to study the VTSIP more in depth. Also, this research may encourage more
school program alignment with the national standards. Additionally, this research could
impact state department and school districts’ professional development and technology
alignment with the standards. Findings of the study may also prompt state departments of
educations and local education agencies to provide technology leadership courses and or
add a component to administrator evaluations that pertains to technology perception and
their incorporation of the national and state technology standards so that administrators
are better prepared for their quest as technology leaders within their schools. The ISTE
Standards-A are national standards and state departments along with local education
departments must be made aware of the standards. This study offers data that can be used
to analyze technology leadership of administrators. Growth is being made in the
knowledge, importance, and perception of technology standards for administrators but
more is needed.
Recommendations

The following recommendations are made from the findings of the study:

1. Further research using a larger population is recommended. This could be within the state or nationwide.

2. Additional research is recommended on the VTSIP as there is no major research on the VTSIP and its effectiveness.

3. Qualitative research is recommended to further understand administrator perceptions of the VTSIP and the ISTE Standards-A.

4. Qualitative research is also recommended to determine barriers and issues that limit administrator perceptions of the VTSIP and ISTE Standards-A.

5. Additional research is also recommended to further examine the subcategories of the ISTE Standards-A and research ways to increase perceptions of the subcategories.

6. Additional research is recommended to look at implementation of the standards in practice.

7. Additional research is recommended to study why males and females and their perceptions of the technology standards differ.
REFERENCES


106


Iudica, A. M. (2011). *University educational leadership technology course syllabi alignment with state and national technology standards*. (Doctoral dissertation), Florida Atlantic University, Ann Arbor.


School leadership. (n.d.) Retrieved from
https://www.principals.org/LegislativeAdvocacy/NASSPLegislativeAgenda/SchoolLeadership.aspx


WELCOME, EXPLANATION, AND SURVEY

Section I:
The International Society for Technology in Education Standards for Administrators (ISTE Standards-A) denote what administrators need to know and be able to do in order to be technology leaders in their schools. The Virginia Technology Standards for Instructional Personnel (VTSIP) denote technology competencies administrators should possess as they facilitate student engagement, information management, and increased student achievement. This questionnaire lists the ISTE Standards-A and their associated performance indicators and the VTSIP.

You will rate the standards in terms of:
1) Your perceived knowledge of the standards (My level of knowledge of this standard is), and
2) Your perceived importance of the standards in your practice/career (This standard is important in my practice).

As you rate each standard please note the following: When responding to your level of knowledge of the standard: consider the rankings absent, poor, average, good or excellent; absent means you have no level of knowledge of the standard. When responding to this standard is important in my practice: consider the rankings strongly disagree, disagree, neutral, agree or strongly agree.

This questionnaire involves a research study to determine your perceived level of knowledge and importance of the ISTE Standards-A and the VTSIP. It should only take twenty minutes of your time to complete the questionnaire. If you agree to participate, your responses will be confidential; additionally, individual responses will not be identifiable. Your participation in this study is voluntary, and you may choose to stop at any time.

Your cooperation is appreciated. If you have any questions, please contact Kimberly Muchenje at kth2@mstate.edu.

Thank you in advance for your participation!

Survey Instrument Statements and Questions

<table>
<thead>
<tr>
<th>ISTE Standard-A Statements and Performance Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section II: Visionary Leadership</td>
</tr>
<tr>
<td>a. Educational Administrators (EA) inspire and lead development and implementation of a shared vision for comprehensive integration of technology to promote excellence and support transformation throughout the organization.</td>
</tr>
</tbody>
</table>
b. EA inspire and facilitate among all stakeholders a shared vision of purposeful change that maximizes use of digital-age resources to meet and exceed learning goals, support effective instructional practice, and maximize performance of district and school leaders.

c. EA engage in an ongoing process to develop, implement, and communicate technology-infused strategic plans aligned with a shared vision.

d. EA advocate on local, state and national levels for policies, programs, and funding to support implementation of a technology-infused vision and strategic plan.

Section III: Digital Age Learning Culture

a. EA create, promote, and sustain a dynamic, digital-age learning culture that provides a rigorous, relevant, and engaging education for all students.

b. EA ensure instructional innovation focused on continuous improvement of digital-age learning.

c. EA model and promote the frequent and effective use of technology for learning.

d. EA provide learner-centered environments equipped with technology and learning resources to meet the individual, diverse needs of all learners.

e. EA ensure effective practice in the study of technology and its infusion across the curriculum.

f. EA promote and participate in local, national, and global learning communities that stimulate innovation, creativity, and digital age collaboration.

Section IV: Excellence in Professional Practice

a. EA promote an environment of professional learning and innovation that empowers educators to enhance student learning through the infusion of contemporary technologies and digital resources.

b. EA allocate time, resources, and access to ensure ongoing professional growth in technology fluency and integration.

c. EA facilitate and participate in learning communities that stimulate, nurture and support administrators, faculty, and staff in the study and use of technology.

d. EA promote and model effective communication and collaboration among stakeholders using digital age tools.

e. EA stay abreast of educational research and emerging trends regarding effective use of technology and encourage evaluation of new technologies for their potential to improve student learning.

Section V: Systematic Improvement

a. EA provide digital age leadership and management to continuously improve the organization through the effective use of information and technology resources.

b. EA lead purposeful change to maximize the achievement of learning goals through the appropriate use of technology and media-rich resources.

c. EA collaborate to establish metrics, collect and analyze data, interpret results, and share findings to improve staff performance and student learning.

d. EA recruit and retain highly competent personnel who use technology
creatively and proficiently to advance academic and operational goals.

e. EA establish and leverage strategic partnerships to support systemic improvement.

f. EA establish and maintain a robust infrastructure for technology including integrated, interoperable technology systems to support management, operations, teaching, and learning.

Section VI: Digital Citizenship

a. EA model and facilitate understanding of social, ethical and legal issues and responsibilities related to an evolving digital culture.

b. EA ensure equitable access to appropriate digital tools and resources to meet the needs of all learners.

c. EA promote, model and establish policies for safe, legal, and ethical use of digital information and technology.

d. EA promote and model responsible social interactions related to the use of technology and information.

e. EA model and facilitate the development of a shared cultural understanding and involvement in global issues through the use of contemporary communication and collaboration tools.

f. Please list any other questions, comments or concerns you would like to convey about your knowledge or the importance of the ISTE Standards-A.

Section VII: VTSIP Standards

a. Administrators demonstrate effective use of a computer system and utilize computer software.

b. Administrators apply knowledge of terms associated with educational computing and technology.

c. Administrators apply computer productivity tools for professional use.

d. Administrators use electronic technologies to access and exchange information.

e. Administrators identify, locate, evaluate, and use appropriate instructional hardware and software to support Virginia's Standards of Learning and other instructional objectives.

f. Administrators use educational technologies for data collection, information management, problem solving, decision making, communication, and presentation within the curriculum.

g. Administrators plan and implement lessons and strategies that integrate technology to meet the diverse needs of learners in a variety of educational settings.

h. Administrators demonstrate knowledge of ethical and legal issues relating to the use of technology.

i. Please list any other questions, comments or concerns you would like to convey about your knowledge or the importance of the VTSIP.

Section VIII: Demographics

1. I am _____ years old. (21-30, 31-40, 41-50, 51-60, > 60)

2. I am currently a _____. (principal, assistant principal, dean, prefer not to
3. I am currently employed as a principal/assistant principal/dean at the following level _____. (elementary, middle, high, prefer not to answer, other)
4. I currently work in Region ___. (1-8) (Click here if you need to determine which region you work in.)
5. I am _____. (African American, Asian American, Hispanic, Native, White/Caucasian, prefer not to answer, other (please specify))
6. I am _____. (male, female)
7. The highest degree I currently hold is a/an _____. (bachelor, master, Educational Specialist, Ed.D., Ph.D., prefer not to answer, other (please specify))
8. How many years have you been an administrator (this includes dean, assistant principal and/or principal)?
APPENDIX B

IRB APPROVAL
NOTICE OF APPROVAL FOR HUMAN RESEARCH

DATE: November 29, 2016
TO: Kimberly Muchenje, Instructional Syst & Workforce Devl
FROM: Jodi Roberts, HRPP Officer, MSU HRPP

PROTOCOL TITLE: Administrators' Perceived Knowledge, Importance, and Perceptions of the International Society for Technology in Education Standards for Administrators (ISTE Standards-A) and Virginia Technology Standards for Instructional Personnel (VTSIP)

PROTOCOL NUMBER: IRB-16-400
Approval Date: November 29, 2016 Expiration Date: December 28, 2018

This letter is your record of the Human Research Protection Program (HRPP) approval of this study as exempt.

On November 29, 2016, the Mississippi State University Human Research Protection Program approved this study as exempt from federal regulations pertaining to the protection of human research participants. The application qualified for exempt review under CFR 46.101(b)(2).

Exempt studies are subject to the ethical principles articulated in the Belmont Report, found at www.hhs.gov/ohrp/regulations-and-policy/belmont-report/

If you propose to modify your study, you must receive approval from the HRPP prior to implementing any changes. The HRPP may review the exempt status at that time and request an amendment to your application as non-exempt research.

In order to protect the confidentiality of research participants, we encourage you to destroy private information which can be linked to the identities of individuals as soon as it is reasonable to do so.

The MSU IRB approval for this project will expire on December 28, 2018. If you expect your project to continue beyond this date, you must submit an application for renewal of this HRPP approval. HRPP approval must be maintained for the entire term of your project. Please notify the HRPP when your study is complete. Upon notification, we will close our files pertaining to your study.

If you have any questions relating to the protection of human research participants, please contact the HRPP by phone at 325.3994 or email irb@research.msstate.edu. We wish you success in carrying out your research project.

Jodi Roberts

Review Type: EXEMPT
IRB Number: IORG0000467
APPENDIX C

PERMISSION FROM SUPERINTENDENT
PERMISSION FROM THE SUPERINTENDENT

HOPEWELL CITY PUBLIC SCHOOLS
103 North 12th Avenue, Hopewell, Virginia 23860
(804) 541-6400  Fax (804) 541-6401

November 4, 2016

Ms. Kimberly Muchenje
Mississippi State University
Starkville, MS

Dear Ms. Muchenje:

Permission is granted for you to recruit administrators from the schools to anonymously complete your pilot study survey entitled Administrators’ Perceived Knowledge, Importance, and Perceptions of the International Society for Technology in Education Standards for Administrators (ISTE Standards-A) and Virginia Technology Standards for Instructional Personnel (VTSIP) for your dissertation.

I understand that the school administrators will be sent an email and link to the survey which will contain consent information and explain the consent process and the survey will take approximately 15 minutes to complete. In addition, survey results will be pooled for the dissertation and individual results of this study will remain confidential and anonymous and no costs will be incurred by either the school or individual participants.

My best wishes to you on a successful survey and dissertation.

Sincerely,

Melody D. Hackney, Ed.D.
Superintendent of Schools

cc:  Dr. Kim Evans, Assistant Superintendent
     for Instruction

Setting The Standard For Excellence
PILOT STUDY COVER LETTER

Mississippi State University

Informed Consent Form for Participation in Research

**Title of Research Study:** Administrators’ Perceived Knowledge, Importance, and Perceptions of the International Society for Technology in Education Standards for Administrators (ISTE Standards-A) and Virginia Technology Standards for Instructional Personnel (VTSIP)

**Researchers:** Kimberly Muchenje, Mississippi State University

**Procedures:** I would like to ask you to participate in a research study. If you participate in this study, you will be asked to complete a survey that will take about 15 minutes to complete.

**Questions**
If you have any questions about this research project, please feel free to contact Kimberly Muchenje at 540-219-7658 or kth2@msstate.edu.

**Voluntary Participation**
Please understand that your participation is voluntary. Your refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may discontinue your participation at any time without penalty or loss of benefits.

Please take all the time you need to read through this document and decide whether you would like to participate in this research study.

If you decide to participate, your completion of the research procedures indicates your consent. Please keep this form for your records.

Please click on the link below to begin or copy and paste the URL below into your internet browser: https://www.surveymonkey.com/r/VKJLSDV

Thank you for your time!

Sincerely,

Kimberly Muchenje
APPENDIX E

PERMISSION LETTER FROM THE VIRGINIA ASSOCIATION OF ELEMENTARY SCHOOL PRINCIPALS
November 9, 2010

Jim Baldwin
Executive Director
Virginia Association of Elementary School Principals
180 Chantilly Street
Richmond, VA 23230

RE: Permission to Conduct Research Study

Dear Mr. Baldwin,

I am an aspiring administrator in the state and work in a Virginia school district. I am currently completing requirements for a Doctor of Philosophy degree and am enrolled in the Instructional Systems Leadership and Workforce Development Program at Mississippi State University in Starkville, MS. I am in the process of writing my dissertation. I am writing to request permission to conduct a research study using members of the Virginia Association of Elementary School Principals. The study is entitled Administrators’ Perceived Knowledge, Importance, and Perceptions of the International Society for Technology in Education Standards for Administrators (ISTE Standards-A) and Virginia Technology Standards for Instructional Personnel (VTSIP).

I hope that you will allow me to recruit administrators from the membership to anonymously complete a survey. Administrators will be sent an email and link to the survey. The email and the survey will contain consent information and explain the consent process.

If approval is granted, participants will complete the survey at their leisure using an online link. The survey process should take no longer than fifteen minutes. The survey results will be pooled for the dissertation and individual results of this study will remain absolutely confidential and anonymous. Only pooled results will be documented. No costs will be incurred by either your association or the individual participants.

Your approval to conduct this study will be greatly appreciated. I will follow up with a telephone call next week and would be happy to answer any questions or concerns that you may have at that time. You may contact me at my email address: km@msstate.edu.

If you agree, kindly print and sign below and return the signed form as an attachment no later than November 11, 2010. Alternatively, kindly submit a signed letter of permission on your association’s letterhead acknowledging your consent and permission for me to conduct this survey using members of the Virginia Association of Elementary School Principals.

Sincerely,
Kimberly Muchonye, Mississippi State University

Approved by:
Jim Baldwin, VAESP Executive Director

Signature: __________________________________________
Date: 11/09/15
APPENDIX F

PERMISSION LETTER FROM THE VIRGINIA ASSOCIATION OF SECONDARY SCHOOL PRINCIPALS
December 1, 2016

Dear School Administrator:

I write to introduce you to Kimberly Muchenje, a doctoral student enrolled in the Instructional Systems Leadership and Workforce Development Program at Mississippi State University in Starkville, Mississippi. She is a math teacher at the Chesterfield Technical Center at Hall Academy 360, Chesterfield Public Schools. Kimberly is conducting research using members of the Virginia Association of Secondary School Principals. Her study is entitled Administrators’ Perceived Knowledge, Importance, and Perceptions of the International Society for Technology in Education Standards for Administrators (ISTE Standards-A) and Virginia Technology Standards for Instructional Personnel (VTSIP).

I ask for your assistance in a study that is of significant interest to the Association that focuses on the technology skills and knowledge of public school administrators in Virginia.

To fulfill her doctoral requirements, Kimberly is conducting a web-based survey that should not take more than 15 minutes of your time to complete. Your participation would be gratefully appreciated.

Sincerely,

[Signature]

Randy D. Barrack, Ed.D., Ph.D.
Executive Director

NASSP AFFILIATE
4909 Cutshaw Avenue • Richmond, VA 23230
APPENDIX G

SURVEY COVER LETTER
Title of Research Study: Administrators’ Perceived Knowledge, Importance, and Perceptions of the International Society for Technology in Education Standards for Administrators (ISTE Standards-A) and Virginia Technology Standards for Instructional Personnel (VTSIP)

Researchers: Kimberly Muchenje, Mississippi State University

Procedures: I would like to ask you to participate in a research study. If you participate in this study, you will be asked to complete a survey that will take about 20 minutes to complete.

Questions

If you have any questions about this research project, please feel free to contact Kimberly Muchenje at 540-219-7658 or kth2@msstate.edu.

Voluntary Participation

Please understand that your participation is voluntary. Your refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may discontinue your participation at any time without penalty or loss of benefits.

Please take all the time you need to read through this document and decide whether you would like to participate in this research study.

If you decide to participate, your completion of the research procedures indicates your consent. Please keep this form for your records.

Please click on the link below to begin or copy and paste the URL below into your internet browser: https://www.surveymonkey.com/r/VKBTCKG

Thank you for your time!